SEPTEMBER, 1961

Plant Engineering®

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The magazine that helps plant engineers with their everyday problems

Volume 15, No. 9 Circulation of this issue 52,210

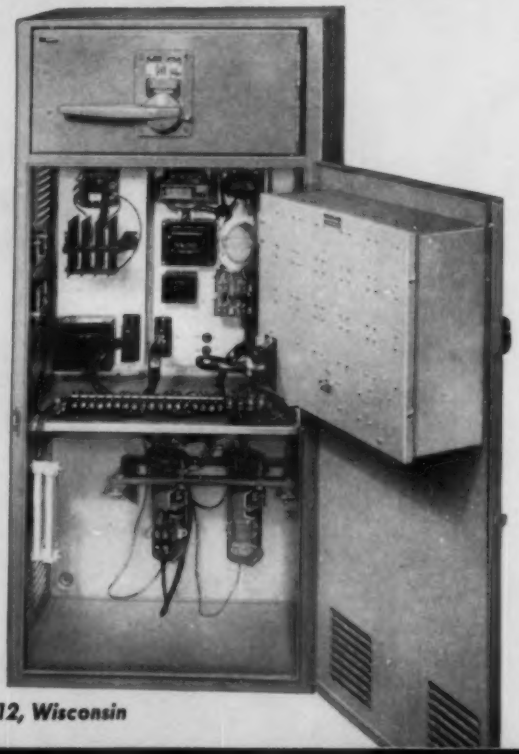
BETTER WELD QUALITY! LESS MAINTENANCE!

with SQUARE D NORpak WELDER CONTROL

Industry's FIRST Transistorized Standard Resistance Welder Control

MAINTENANCE IS PRACTICALLY NON-EXISTENT

because ***NORpak*** static control elements replace control tubes in the logic panel, eliminating the most common cause of trouble. ***NORpak*** transistorized units have no moving parts to wear, no filaments to burn out. They are encapsulated in epoxy resin for protection from atmosphere and physical damage, and are guaranteed against defects for one year. Versatility of ***NORpak*** units makes it easy to provide any special sequence required.



BETTER WELD QUALITY

results from greater timing accuracy. ***NORpak*** welder control is available with either resistor-capacitor timing circuits or cycle-counting circuits for absolute accuracy. Timing is not affected by normal line voltage fluctuations because of a built-in regulated power supply.

EASY-TO-HANDLE COAXIAL IGNITRON TUBES

are smaller, have higher peak current capacity, and are plastic-coated for greater safety.

OPTIONAL DISCONNECT SWITCH

available in 200 or 400-ampere rating, fusible or non-fusible. Power wiring is easy, and NEMA terminal markings are used throughout.

GET THE COMPLETE STORY...

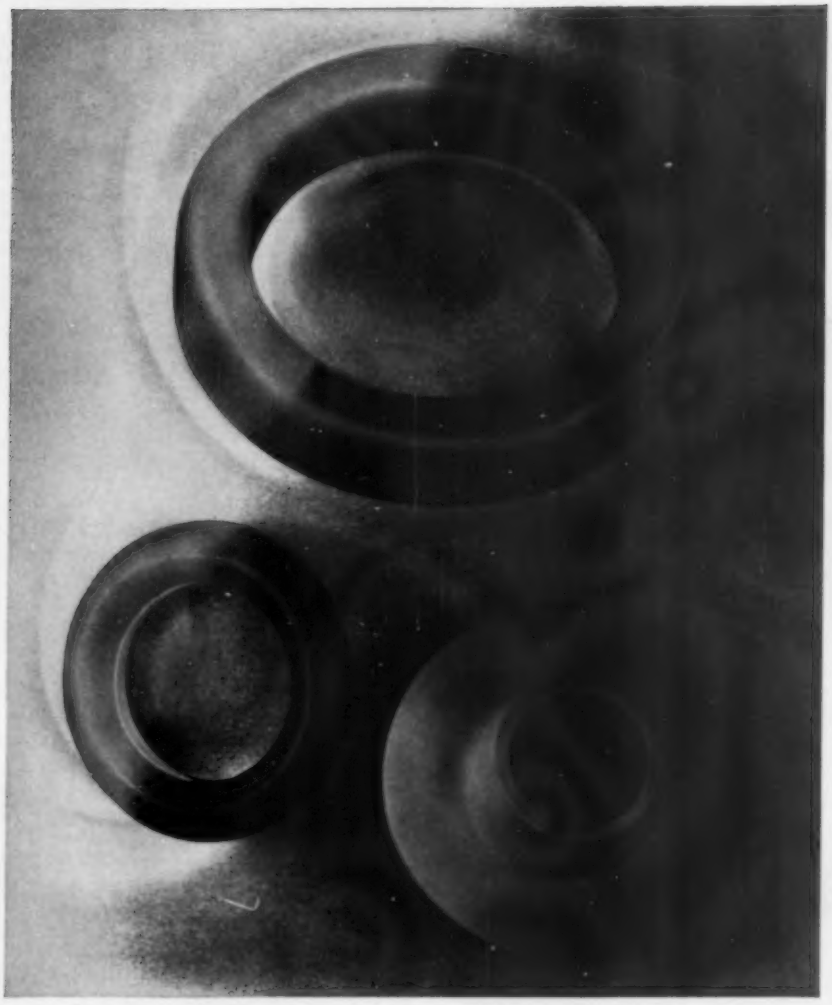
Write Square D Company, Dept. SA, 4041 North Richards Street, Milwaukee 12, Wisconsin

SQUARE D COMPANY

wherever electricity is distributed and controlled

Circle 501 on postcard, page 33

MOLY-S_2*, the newest of a variety of impregnations, is available in all shapes of Garlock leather packings . . . molded cups, "U" and "V" packings, washers, gaskets, discs, hat packings.



REMARKABLE NEW MOLY-S_2 IMPREGNATE

. . . adds exceptional anti-friction properties to Garlock leather packings. This new packing lubricant—molybdenum disulfide, a solid material—greatly reduces frictional drag at high pressures (above 1500 p.s.i.), and minimizes wear during break-in periods at low pressures. Heretofore highly effective as a metal lubricant, MOLY-S_2 is now successfully impregnated deeply and evenly throughout the fibers of Garlock leather packings, where it cannot be washed away by operating fluids or forced out under severe pressures. MOLY-S_2 has no melting point, will not separate or break down, is insoluble in water, and contains no graphite or fillers.

Because of its unusual adhering qualities, new MOLY-S_2 impregnate is excellent where fluid or gaseous mediums provide little lubrication to moving parts, or where high pressures limit the amount of vital surface lubricating film. For ideas on how you can apply Garlock leather packings with MOLY-S_2 impregnation, talk to your local Garlock representative. He's at the nearest of the 26 sales offices and warehouses throughout the U. S. and Canada. Or, write for catalog AD-186. Garlock Inc., Palmyra, N. Y.

Canadian Div.: Garlock of Canada Ltd.

Plastics Div.: United States Gasket Company.

Order from a complete line of quality Garlock products . . . Packings, Gaskets, Seals, Molded and Extruded Rubber, Plastic Products.

*Garlock Trademark for molybdenum disulfide

GARLOCK

Circle 502 on postcard, page 33

Plant Engineering September 1961, Volume 15, No. 9

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'ROUND ABOUT with the editors

Edited by R. L. Marinello

Seminar on Construction Specs

A TWO-DAY educational meeting on preparing contracts and specifications will be held at the University of Wisconsin Extension Division on October 19 and 20. The program is being presented in cooperation with Region 7 of the Construction Specification Institute.

Topics which will be discussed at this meeting include: Contract Documents, Legal Principles as Applied to Construction, Bidding Procedures, Bonding of Bidders and Insurance for the Construction Industry.

Inquiries concerning this program—Preparing Construction Contracts and Specifications—should be directed to Edward O. Busby, 3040 Stadium, The University of Wisconsin, Extension Division, Madison 6, Wisconsin.

Named Plant Engineer

C. Donald Schoonmaker has been appointed plant engineer at Aerosol Techniques, Inc., Bridgeport, Connecticut.

He was formerly plant engineer with King Container Company and production manager at the Tension Envelope Company. He is a native of Newburgh, N. Y., and was graduated from Stevens Institute of Technology.

Welding Workshop Courses

FOUR SHORT workshop courses designed to upgrade key personnel to direct, control and evaluate fusion welding operations will be conducted this fall by Hobart Brothers.

Each course is for a five-day period. Text and complete package of reference material will be furnished. Following is a schedule of the four courses which will be made available.

Arc Welding Inspection and Quality Control—October 9 to the 13. This course outline covers the importance of quality welding in manufacturing and construction.

Welding Fundamentals for Supervisors and Engineers—November 13 to the 17. Arc welding procedures, principles and economical applications will be discussed and demonstrated.

Automatic Welding for Management—November 27 to December 1. This will consist of a complete explanation of the requirements, equipment-wise, for each process and an explanation of the electrical requirements.

Gas Shielded Arc Welding Process—December 4 to the 8. This course covers a thorough explanation of the tungsten-inert-gas arc welding process, its operation and its application.

Reservations or further information may be obtained from the School Director, Hobart Brothers Technical School, Troy, Ohio.

Isotope Course for Engineers

A SPECIAL radioisotope techniques course and its application to engineering research, development and continuous process measurement and control has been developed by the Oak Ridge Institute of Nuclear Studies.

The engineering course sequence is arranged so a participant may choose either four or six weeks of instruction. The first two weeks are devoted to basic radiation physics and radiation detection. The second two weeks deal more specifically with engineering and industrial techniques.

Emphasis in the second portion is on gaging, radiography with sealed sources, tracers, process control and measurement, engineering research with radioisotopes, and factors affecting the design of radioactive applications.

The last two weeks deals with more advanced, specialized industrial and research techniques.

All inquiries and requests for application blanks should be addressed to Dr. Ralph T. Overman, Special Training Division, Oak Ridge Institute of Nuclear Studies, P. O. Box 117, Oak Ridge, Tennessee.

Plastics-in-Buildings Exhibit

THE SOCIETY of Plastics Engineers' traveling educational exhibit, "Plastics—A New Dimension in Buildings," will go on tour and be shown during the next year in six locations in the southern and mid-western United States.

The first stop will be at the Memphis (Tenn.) Museum from September 1 through the 30th. The rest of the itinerary is: Columbia Museum (Columbia, S.C.) October 8 through the 30th; Museum of Arts (Birmingham,

Subscriptions: U.S.A. $10. Canada $11. Other countries $12 per year. Single copies $1. Change of address: Send to PLANT ENGINEERING, Circulation Division, Barrington, Illinois. Please supply position title, company name, company address. Request must reach us by the 15th of month to make the change effective with following month's issue. Published monthly and accepted as controlled circulation publication at Milwaukee, Wis.

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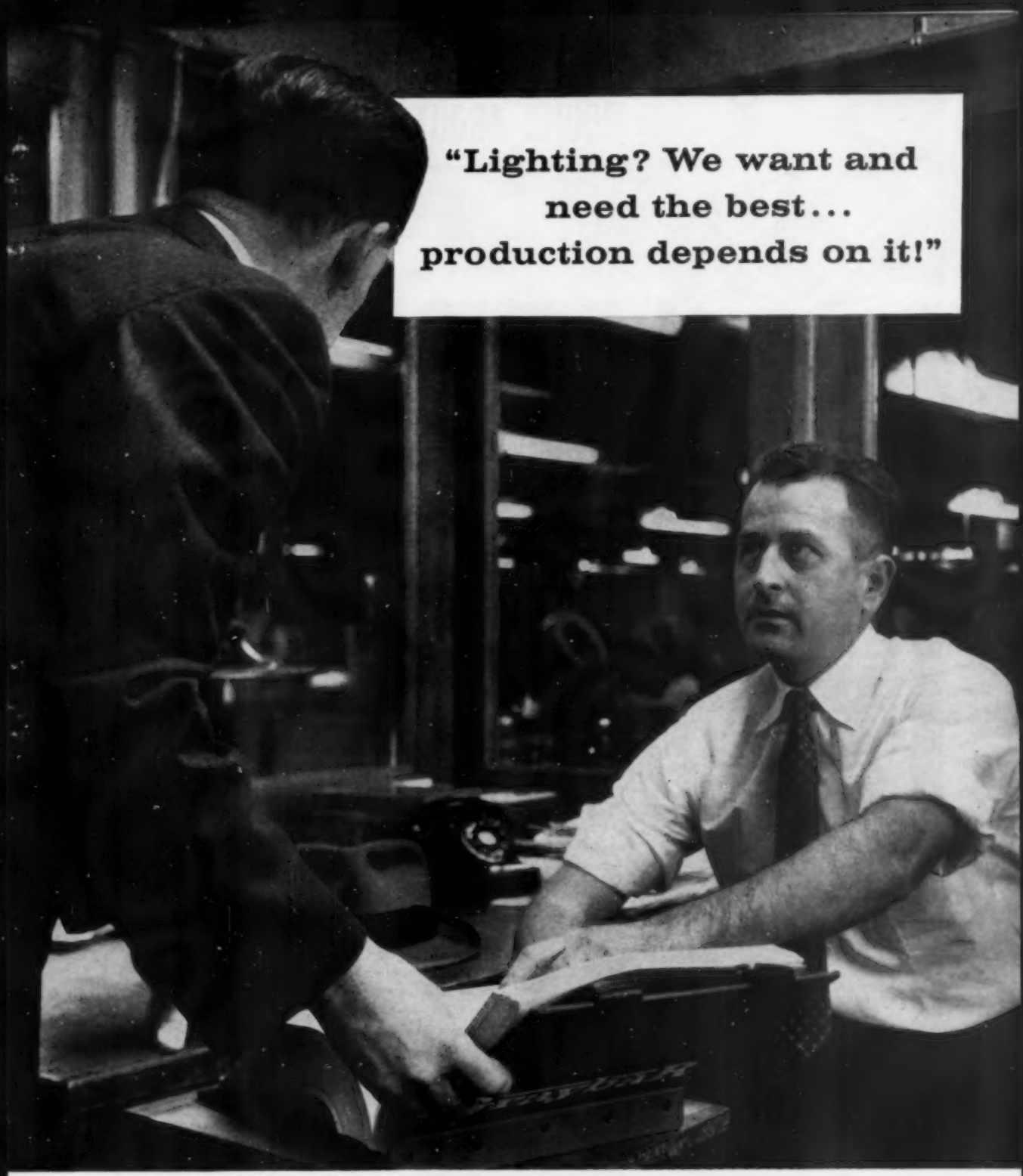

Planned lighting *can* improve output. Consult with your Graybar man: he is well versed in the best and latest in lighting for better production, in plant or office.

Moreover, Graybar offers the widest selection of lighting equipment* available from *any single source!* For lighting . . . or ventilation, motors, controls, power distribution equipment . . . call Graybar. We'll work with you or your electrical contractor. 96

*and G-E lamps, too

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Everything Electrical GraybaR ELECTRIC COMPANY

Circle 503 on postcard, page 33

PAGE FENCE

These 3 VALUES are important

1. QUALITY is important. When you invest in a fence you want it to last for a long, long time. When you specify PAGE you get 77 years of our experience in the design and manufacture of a quality fence. Page Fence is engineered for long-lasting service.

2. WIDE CHOICE is important. For example, we offer a choice of 4 chain link fabrics—ACCO-Aluminized, our latest development, or galvanized steel, stainless, or solid aluminum. Each of these has characteristics which meet individual preferences or make it more suitable to meet certain climatic or service conditions. Furthermore, there are 8 basic fence designs and 6 gate styles. No other company can serve you with so wide a selection.

3. INSTALLATION is important, too. A fence can be no better than the quality of its erection. The Page Fence Member in your locality is trained, experienced, responsible, and interested in your satisfaction.

• • •

When you write us, we'll send you the whole story in a helpful booklet, and the name of our nearest Member. Call him, he will gladly suggest the best answer to your property protection problem.

Helpful booklet describes fence styles, gates and, components

PAGE FENCE ASSOCIATION
National Headquarters • Monessen, Pa.
A product of Page Steel & Wire Division American Chain & Cable Co., Inc.

Circle 504 on postcard, page 33

'ROUND ABOUT

Ala.) December 1 through the 31st; National Housing Center (Washington, D.C.) January 15 through February 11, 1962; Columbus Museum of Arts and Crafts (Columbus, Ga.) March 1 through the 31st; Walker Art Center (Minneapolis, Minn.) April 15 through May 15. Additional locations are being planned for the remainder of 1962.

Promoted to Chief Engineer

Edward W. Ruhe has been promoted to the newly-created position of chief engineer of the engineering and maintenance department of Olin Mathieson Chemical Corporation's Metals Division plant at East Alton, Illinois.

In his new position, he will be responsible for all mechanical and maintenance functions for brass strip, Roll-Bond and fabrication operations.

He is a native of Chicago Heights, Illinois, and was graduated from the Illinois Institute of Technology with a B.S. degree in mechanical engineering. He held various engineering positions with the American Manganese Steel Company, the American Can Company and Morgan Engineering Company before joining the Olin organization in 1950 as a machine design engineer. Later he became assistant chief engineer of their Western Brass Mill at East Alton. He was appointed manager of the Roll-Bond section in 1957.

Shop Practices—Navy Style

AN EASY-TO-USE lighting calculator designed for shipyard use, a portable electric oven for baking paint, and a mobile welding unit are described in a collection of machine shop practices recently adopted by the Navy's Bureau of Ships for use by its industrial facilities. Many of these ideas may be adaptable to industrial applications.

Compiled from suggestions made by Navy employees, the collection of 72 time- and labor-saving devices is now available in an illustrated booklet.

This 29-page booklet is identified as Bureau of Ships Shop Practice Suggestions No. 3, May 1961. It is available from the Office of Technical Service, U. S. Department of Commerce, Washington 25, D. C. Price is 50 cents.

Metal Conference and Show

TEN TECHNICAL societies and trade associations will participate in the Detroit Metal Show conference program. The event will take place October 23 through the 27th in Detroit's Cobo Hall.

Sessions will run concurrently with presentation of exhibits. Sixty-two sessions with more than 200 technical papers have been programmed by the societies, most of which will take place in Cobo Hall meeting rooms adjacent to the exhibits.

Further information about the conference or show is available from the American Society for Metals, Metals Park, Novelty, Ohio.

Plastic Foams Conference

PLASTIC FOAMS will be discussed extensively at a Regional Technical Conference of the Society of Plastics Engineers. It will be held at the Hotel Lafayette, Buffalo, New York, on October 5.

The conference program will consist of 17 papers, divided into two concurrent sessions on rigid and flexible foams, and will cover all the new developments in this field. Papers will include discussions on polypropylene, polyethylene, urethane, epoxy, vinyl, silicone and polystyrene foams. Incorporated in each of the technical sessions will be a concluding panel discussion and opportunity for questions from the registrants.

Requests for further information and advance registrations should be directed to Andrew J. Hammerl, Registration Chairman, Durez Plastic Division, North Tonawanda, New York.

Western Building Show

MANY CONSTRUCTION industries in the Western states will participate in the four-day Western Building Industries trade show. It will be held at Los Angeles' Great Western Exhibit Center from October 7 to the 10.

Plans for the show include proposed features on industrial planning and development, demonstrations of construction methods and equipment, materials handling, storage and traffic planning.

For further information on the Western Building Industries Exposition, write to A. Byron Perkins & Associates, Inc., 2216 South Hill Street, Los Angeles, California.

CLIMAX MOLYBDENUM

Molysulfide® News Digest

CLIMAX MOLYBDENUM COMPANY, a division of American Metal Climax, Inc., 1270 Avenue of the Americas, New York 20, N.Y.

RECENT TEST SHOWS MORE PROOF OF MoS_2's LOAD-CARRYING ABILITY

New Teflon-MoS_2 Bearing Component Withstands Temperatures Up To 575°F

A new precision ball bearing, which operates at temperatures up to 575°F and needs no conventional lubrication, is now coming off the lines at the Barden Corporation's plant in Danbury, Conn. Trade-named BAR-TEMP, the new bearing utilizes a ball retainer of reinforced Teflon compounded with "Moly" lubricant. Resistance to deformation is much higher than that of pure Teflon*. Also, the material serves as a *dry lubricant*. As the bearing rotates, microscopic amounts of Molysulfide rub off and are deposited on the raceways. Result: long bearing life at temperatures where conventional lubricants fail.

Successful applications include synchros, fans, motors, blowers, barometic pressure switches, tachometer generators, and other devices operating from 1,000 to 24,000 rpm, at temperatures ranging from –100°F to 575°F.

*T.M. E. I. du Pont de Nemours & Co., Inc.

When writing, refer to CL-105

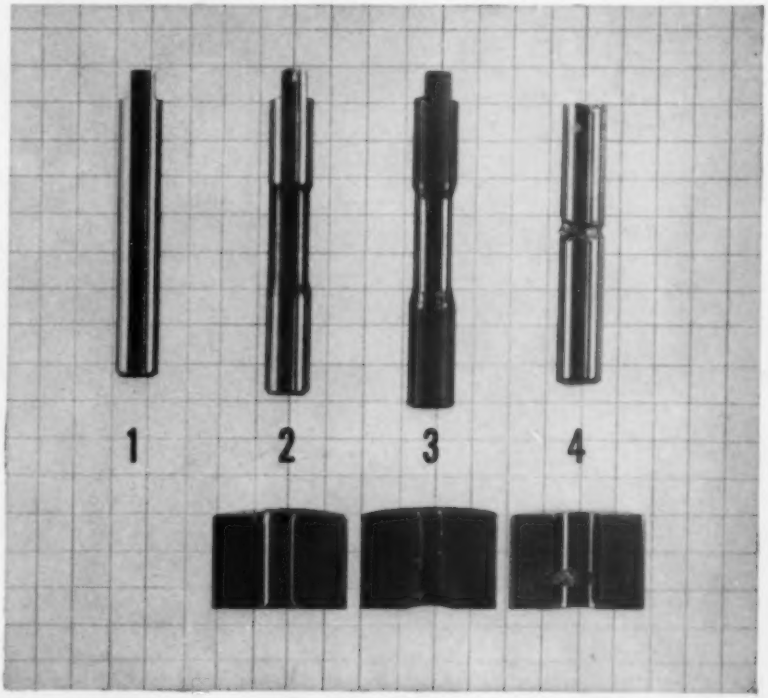
"Moly" GIVES WIRE ROPE 45% MORE BENDING LIFE

That's the forthright verdict of one of the leading wire rope manufacturers, which recently tested its MoS_2-lubricated wire rope against four other leading brands. Fatigue tests and field tests demonstrated the rope's ability to outlast other premium wire ropes in service.

Used as an ingredient in wire drawing compound, Molysulfide creates a micro-shield around each wire. This smooths out minute surface imperfections and prevents the wires from grinding together as the rope flexes. Result: reduction of internal friction —better resistance to fatigue—far longer rope life.

When writing, refer to CL-106

From the German laboratory of Alpha Molykote Corporation comes new proof of Molysulfide's® ability to resist galling and seizing at pressures beyond the yield point of most metals. Previous tests have shown that MoS_2 sustains loads up to 475,000 psi. In this Almen Wieland test, similar to the Falex test, a ¼" pin actually extruded *without any surface damage* at pressures of 100,000 psi, while similar pins using other lubricants were torn, galled or "frozen" to the point of breakage.



The photo above shows mild steel pins used in Almen Wieland test. No. 1 is unused Control Pin. No. 2 (lubricated with mineral oil and MoS_2) and No. 3 (with MoS_2 bonded coating) were elongated and extruded without weight loss. No. 4 shows typical failure with conventional lubricant. Note that the key sheared off and that pin and block were galled and seized. Surveys of many laboratories indicate that the extrusion phenomenon exhibited by No. 2 and No. 3 pins has never been produced with any other conventional lubricant.

As a result of Molysulfide's unique pressure-sustaining ability, MoS_2 is widely used as a "break-in" lubricant which prevents abrasion and seizing, permits shorter "break-in" runs, and prevents bearing damage when boundary lubrication occurs.

When writing, refer to CL-107

It moves

... powered and controlled by Westinghouse

Press a button—an indoor auditorium becomes an open air stadium in 2½ minutes—and behind that button is an unparalleled story of engineering and construction cooperation.

Architectural and engineering teamwork has given Pittsburgh the world's first movable roof auditorium. This versatile structure adds to the city's renaissance, in one building, a 14,000 seat sports arena, a convention hall, open air amphitheater, and an exhibit center. Westinghouse products bring the facilities to life, give precision control for the delicate manipulation of six 300-ton movable leaves.

Outwardly, the new auditorium is a 400′ stainless steel

J-94176-1

umbrella, suspended from a space frame cantilevered from the ground. That is one outstanding construction teamwork story.

Inside, coordination culminates in a control console located high above the seating area. From this station the

Construction Motivators: The Authority & Industry
l to r seated: Judge A. L. Wolk, Vice Chmn.; N. Stabile, Sec'ry Treas.; W. B. McFall, Chairman; H. R. Edelman, Jr., Pres. Heyl & Patterson; and D. J. McDonald, Vice Chmn.
standing: C. B. Jansen, Member; J. E. Payne, V. P. Westinghouse; and Edw. Fraher, Exec. Director

J-941/6-2

The six movable roof leaves are driven by Westinghouse right angle gearmotors, five to each leaf. Photo shows base of one of the movable leaves with the acoustic ceiling panels removed.

O. M. Newman, Heyl & Patterson, and Edward Cohen, Ammann & Whitney, discuss roof electrical drive with C. G. Falkenstein, Westinghouse, kneeling in front of main roof reactor control cabinet.

unique movable roof drive system is activated. An AC reactor control scheme keeps all six movable leaves in step throughout open and close cycles. Each leaf is driven by Westinghouse Moduline® gearmotors, with opposite leaves being operated in pairs.

Close cooperation among architects, engineers, owner, contractors and Westinghouse helped to provide a system flexible enough to serve varying building demands, with the high degree of electrical reliability required.

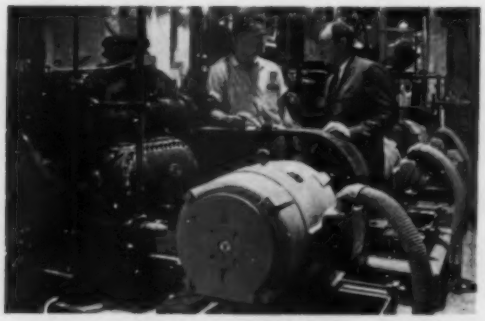
For more complete information on the electrical aspects of construction, write to: Westinghouse, P. O. Box 868, Pittsburgh 30, Pennsylvania.

J-94176-3

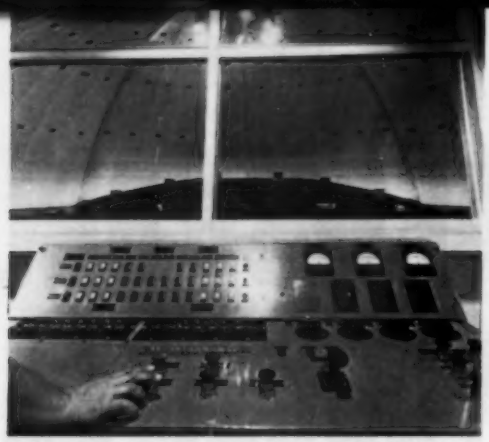
5KV metal-clad switchgear contains a tie-breaker to provide emergency switching between two incoming 4160-V lines. Seen here: N. J. Grady, V. P., Ernst, C. J. Long, and A. B. Janaszek.

Checking construction progress are C. J. Long and F. J. Sarknas, Westinghouse. In background, 1500 kva power center supplies power for building auxiliary and air conditioning compressor motors.

Westinghouse Motor Control Center located in the Mechanical Room centralizes auxiliary motor controls. Discussing installation advantages are H. R. Helvenston, C. J. Long and N. J. Grady.



Three 125 hp Lifeline A motors drive freon compressors to chill brine supply for ice rink piping. Seen here are P. F. Schad, Limbach, and C. G. Falkenstein, Westinghouse.

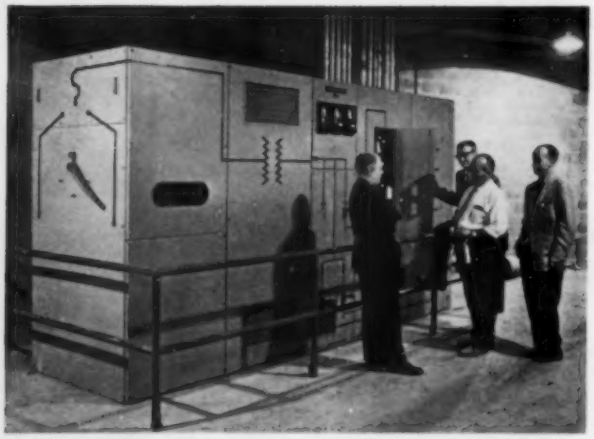


Operator's view from roof control console high above the spectator area. Visible through the glass front is the juncture of the first two movable leaves of the roof.

One of main power transformers rated 2500 kva at 11.6 kv to 4160 volts. Discussing the power supply are C. J. Long, Electrical Engineer, M. A. Geffel, Ernst, and A. B. Janaszek, Westinghouse.

Builder: Public Auditorium Authority of Pittsburgh & Allegheny County: *Resident Engineer & Supt. of Construction:* H. Rey Helvenston
Architects: Mitchell & Ritchey, Pittsburgh
Roof Designers & Engineers: Ammann & Whitney, N.Y.
Electrical Engineer: Carl J. Long & Associates, Pittsburgh
Mechanical Engineer: John Mullin & Associates, Pittsburgh
General Contractor: Dick Corporation, Large, Pa.
Electrical Contractor: E. C. Ernst, Inc., Pittsburgh
Mechanical Contractor: Limbach Company, Pittsburgh
Drive System Contractor: Heyl & Patterson, Inc., Pittsburgh

Westinghouse



Another Westinghouse power center, this 300 kva ASL dry type supplies lighting and auxiliary power. Discussing its component parts are C. J. Long, A. B. Janaszek, M. A. Geffel and Albert Simon, Ernst.

Type M Electric Stairway transports 8,000 persons /hr. Top to bottom: E. R. Gallagher, supervising architect; H. R. Helvenston, resident engineer; and A. Simmonds, Westinghouse Elevator.

Fan room equipped with series 8000 Air-Foil centrifugal fan and air conditioning coils. W. Y. Humphreys, Westinghouse, with John Mullin, Consulting Engineer, air conditioning and ventilation system designer.

Westinghouse mercury vapor parking area and floodlighting are operated from this remote control panel located in the mechanical room. M. A. Geffel, Ernst, tests lighting circuits.

J-94176-4

GOODYEAR

NEWS! ONLY V-BELTS BY GOODYEAR

to give you sets matched in length to pull together

What's more, Green Seal V-Belts give you—

True dimensional stability for the life of the belt—built in through the use of shrink- and stretch-resistant 3-T Process Cord or airplane-type steel cable.

Mildew-inhibited construction for protection in damp operating conditions.

Widest selection from the most complete V-belt line anywhere.

Ready availability from distributor stocks in every part of the country.

Technical assistance whenever it's needed from a qualified expert, the G.T.M.—Goodyear Technical Man.

For the best buy in V-belts call your Goodyear Distributor. Or write Goodyear, Industrial Products Division, Akron 16, Ohio.

Lots of good things come from GOOD

GREEN ✿ SEAL ARE CODED TO 1/32"...

perfectly for longer, more trouble-free service

LENGTH-CODING GREEN SEAL V-BELTS TO 1/32"—NOT JUST 1/10", LIKE MOST BELTS—takes this ultra-precision machine. Only Goodyear has this type equipment, which is set by means of fine tolerance steel templates to insure accuracy. Machine readings are in the actual code numbers used to eliminate errors.

Green Seal—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

YEAR INDUSTRIAL PRODUCTS

Circle 508 on postcard, page 33

Carbon building up in your compressors? Here's why one of the many Sun Solnus oils can be your answer. The valve on the left is from a three-stage Norwalk horizontal-type compressor after 3,000 hours operation with a well-known high grade oil. At the right is the same valve after being torn down and examined after a 3,000 hour run with a Sun Solnus oil. Note the difference in carbon deposits! *Solnus oils form very little carbon . . . and what does form is so soft and fluffy it can be blown away.*

somewhere in your plant . . .

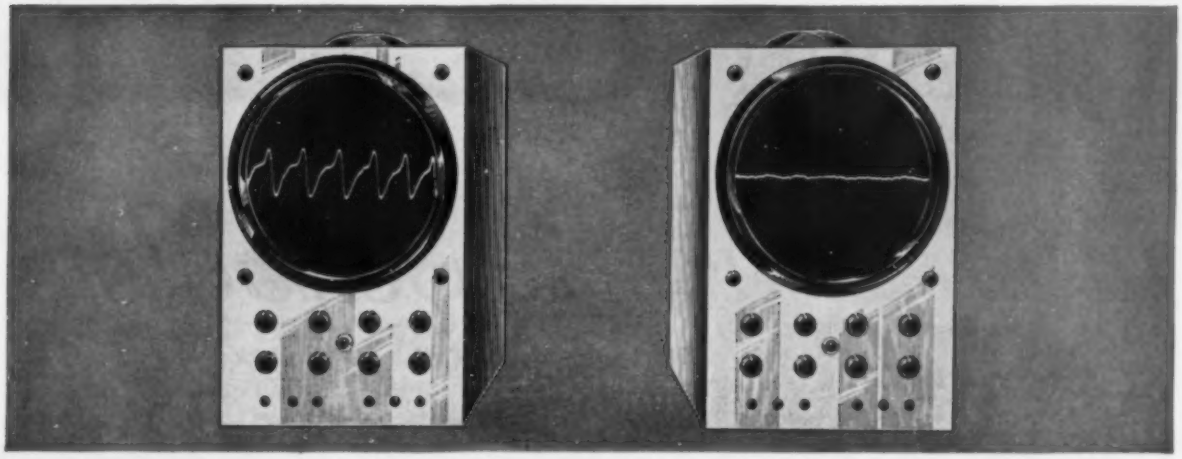
A SUNOCO PRODUCT CAN STOP TROUBLE, CUT COST!

SUNOCO
Quality . . .
THE BEST ECONOMY OF ALL

The reason is as simple as this. There are over 400 Sunoco petroleum products for industry. *Each* has the properties needed to do its job right. *Each* is job-fitted by men who know what they are doing. And *each* is backed by the service you have a right to expect. The examples on these pages will give you an idea of what we mean by Sunoco quality . . . and how quickly that quality can pay off in your applications. Call your Sunoco representative today for a hand on any problem with any petroleum product you are using. Or write to:

SUN OIL COMPANY, PHILADELPHIA 3, PA., DEPT. PY–9
In Canada: Sun Oil Company Limited, Toronto and Montreal

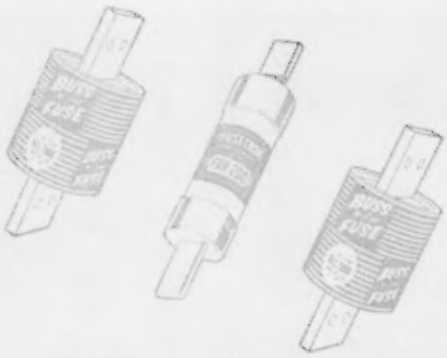
Hydraulic oils chewing up your O-rings, packings? The O-ring on the left was soaked in a Sun Solnus oil for 70 hours at 300F and is still as pliable as when new. The O-ring at the right was soaked in another hydraulic oil for equal time. It snapped like a match stick when flexed, for many hydraulic oils extract plasticizers from seals turning them brittle, creating leakage, replacement problems. Besides keeping rings flexible, Solnus oil restores pliability to unbroken rings already in service.



Slip-stick table motion ruining fine work pieces? These are magnified oscillogram patterns of slip-stick table motion. The jagged pattern on the left resulted when regular way oil was used on the ways; the straight line on the right, when Sunoco Way Lubricant was used under identical operating conditions. Here is graphic evidence of how effectively you can stop slip-stick table motion, protect the ways, get better surface finishes, and cut production losses with job-fitted Sunoco Way Lubricant.

Hydraulic lines gunked up? The fouled up line at the left was cleaned out in no time when a Sunvis 700 hydraulic oil was used in the system! These oils are especially made to keep contaminants in suspension, flush them away to the filters while transmitting power. They are so effective that a single charge of a Sunvis 700 oil can keep even a continuously contaminated system running smoothly for months, often *years*. Check your Sunoco representative for a job-fitted Sunvis oil for your systems.

Circle 509 on postcard, page 33



Electrical Protection goes MODERN with BUSS Fuses...

in All-Electric Schools

Utica Michigan

Electricity heats, lights, pumps water, cooks and operates all motor driven equipment in the West Utica and the Ewell Elementary Schools. No other utility service is used except the telephone.

The complete use of electrical energy puts special emphasis on the need to use the safest, most modern protective devices throughout the electrical system.

In each school, the main switchboard is protected by 3—1600 ampere BUSS Hi-Cap fuses having an interrupting rating of 200,000 amps. rms symmetrical. Thus, safe interruption of fault currents now available is assured,—and the fuses are adequately safe to allow for future system growth.

If a high fault current should occur, the fast opening characteristics of BUSS Hi-Cap fuses further protect the circuits and equipment against damage by restricting let-thru fault currents to safe value.

Feeder and branch circuit protection

To provide the safest short-circuit and overload protection . . . and to prevent needless outages,—FUSETRON dual-element fuses are used in the feeders and branch circuits of these schools.

For modern, all-purpose protection of circuits up to 600 amps., FUSETRON fuses cannot be equalled. They have 100,000 amp. interrupting capacity,—and sufficient time-lag to hold harmless overloads.

For more information on

FUSETRON dual-element fuses *. . . write for bulletin FIS*

BUSS Hi-Cap fuses *. . . write for bulletin HCS*

BUSSMANN MFG. DIVISION, *McGraw-Edison Co.* **St. Louis 7, Mo.**

EWELL ELEMENTARY SCHOOL

Architects—
SMITH & SMITH / ASSOCIATES
Royal Oak, Michigan

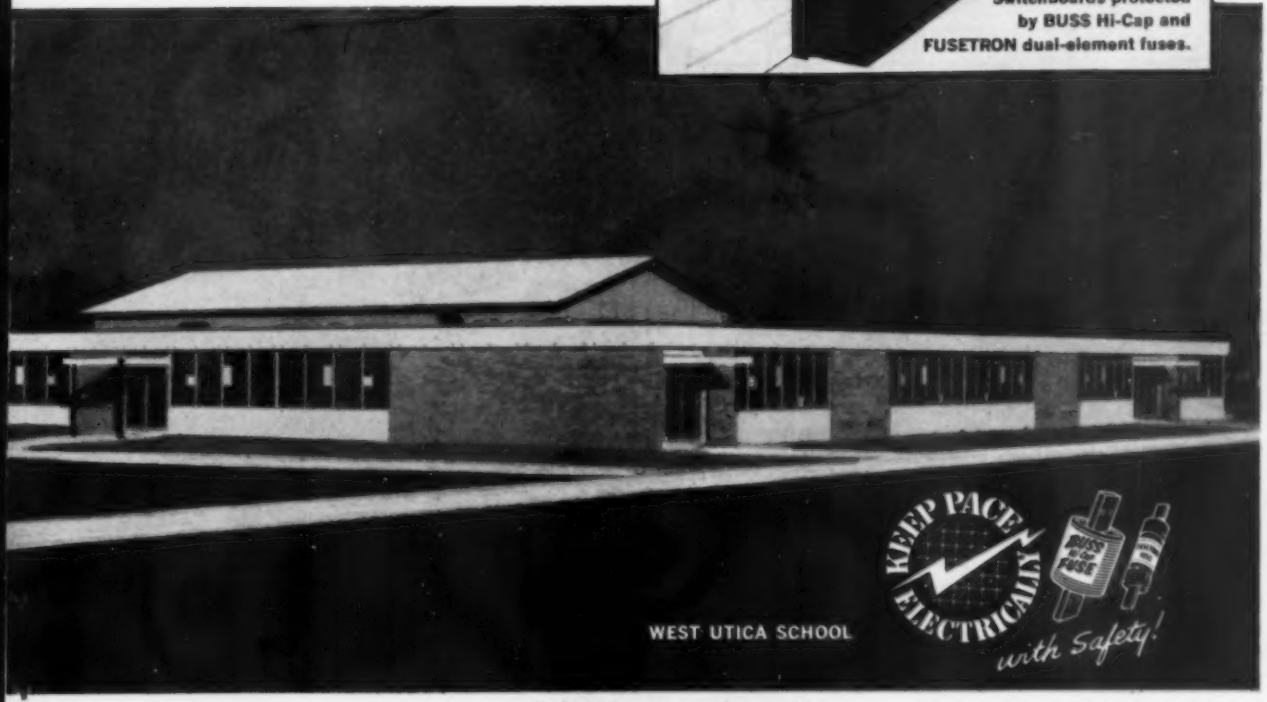
Consulting Engineers—
B. A. KING & ASSOCIATES, INC.
Birmingham, Michigan

Electrical Contractors—
SCHEPER'S ELECTRIC CO.
Utica, Michigan

General Contractors—
Ewell Elementary School
GILBERT & KERNER
Utica, Michigan

West Utica School
CHISSUS CONSTRUCTION CO.
Birmingham, Michigan

Switchboards protected by BUSS Hi-Cap and FUSETRON dual-element fuses.



WEST UTICA SCHOOL

KEEP PACE ELECTRICALLY with Safety!

Circle 510 on postcard, page 33

RUGGED, RELIABLE, LOW PRICE HOIST

Low price . . . yes! But within the rigid, high-strength aluminum alloy frame and steel covers of R&M's Type J Hoist, you'll find carefully engineered features that assure rugged, reliable duty! The high-torque, totally-enclosed R&M motor has 30 min., 55° C. time-rise rating. Magnetic disc-type motor brake prevents hook drift . . . you get a Weston-type load brake too. Upper and lower limit switches prevent hook block over-travel. Triple-reduction gearing of heat-treated alloy steel gives hard working surfaces and shock-resistant teeth. Ball bearings, used throughout, are oil bath lubricated or lifetime sealed. Push button magnetic controls operate on reduced voltage. Type J's are stocked near you, in capacities of ¼, ½, 1 and 2 ton. Lug mounting is standard . . . choice of push, hand-geared or motorized trolley. Write today for Bulletin 905-PE

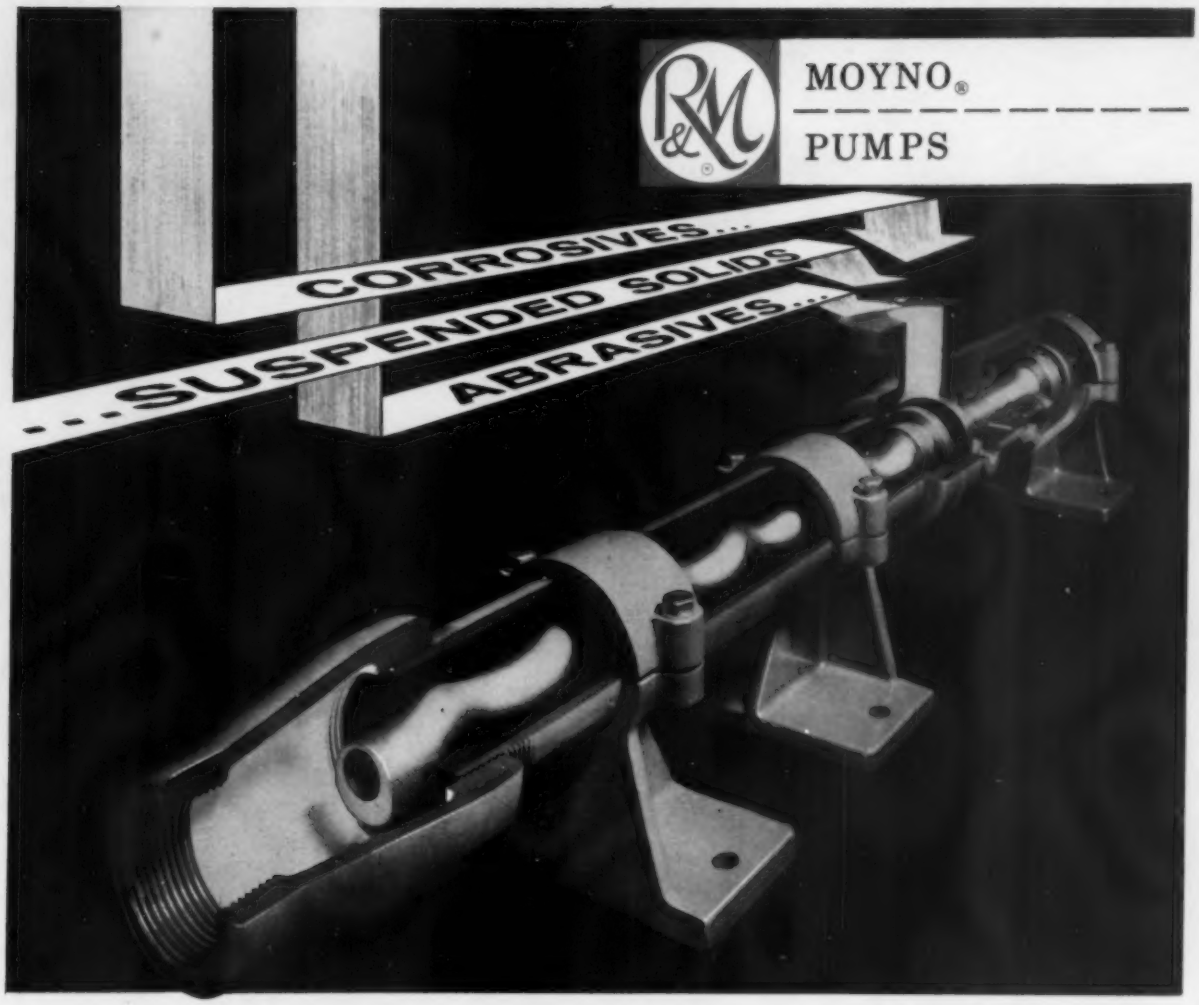
magnetic disc-type motor brake
R & M high-torque hoist motor
upper and lower limit switches
oil bath lubricated Weston-type load brake, triple reduction gears

take it up *with R&M*®

ROBBINS & MYERS, INC., Springfield, Ohio

Electric Hoists and Overhead Traveling Cranes • Fractional and Integral HP Electric Motors • Moyno® Industrial Pumps
Propellair® Industrial Fans • R & M-Hunter Fans and Electric Heat • Trade-Wind Range Hoods and Ventilators
Subsidiary companies at: Memphis, Tenn., Pico Rivera, Calif., Brantford, Ontario.

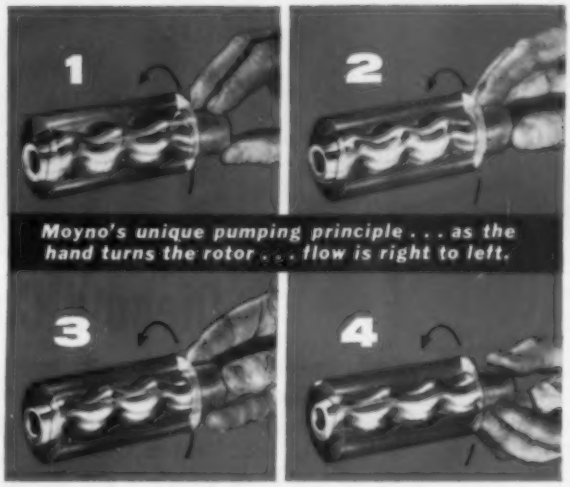
Circle 511 on postcard, page 33



MOYNO® *solves tough pumping problems!*

Moyno's "progressing cavities" successfully handle thin watery slurries, non-pourable abrasives, gnawing corrosives or suspended solids up to 1⅛" dia.—without crushing, foaming or aerating! Material contacts only one moving part, a screw-like rotor revolving in a double-threaded stator. Where corrosives or abrasives are to be handled, rotor and stator are made of special resistant materials that minimize maintenance and prolong pump life. Many materials now pumped by Moyno were once considered "unpumpable" . . . had run up prohibitive maintenance costs on other type pumps or ruined them completely!

Moyno pumps are available in capacities to 500 gpm; pressures to 1000 psi. Learn more . . . write today for new Bulletin **100-PE!**



Moyno's unique pumping principle . . . as the hand turns the rotor . . . flow is right to left.

ROBBINS & MYERS, INC., Springfield, Ohio

Fractional and Integral HP Electric Motors • Electric Hoists and Overhead Traveling Cranes • Moyno® Industrial Pumps
Propellair® Industrial Fans • R & M-Hunter Fans and Electric Heat • Trade-Wind Range Hoods and Ventilators
Subsidiary companies at: Memphis, Tenn., Pico Rivera, Calif., Brantford, Ontario.

Circle 512 on postcard, page 33

At Diebold, Inc., a total of 300 Perfection Schwank Gas *Infra-Red Heaters maintain a constant 70° in 11*

Diebold Cuts Heating Costs 35%...with

"We know it sounds impossible, but our Perfection Schwank *Gas* Infra-Red Heating System has reduced heating costs 35%," says William Roby, Assistant Plant Engineer at Diebold, Inc., Canton, Ohio. "Heating comfort alone would have justified our investment, but here's the clincher. In another 2½ years, our tangible savings in heating costs will have completely paid for the entire *gas* infra-red system! Gas keeps the *fuel* cost low. And there are practically no maintenance costs."

"It's as simple as this . . . in the Fall we turn the *gas*-fired system on . . . and in the Spring we turn it off. In nearly two full heating seasons, our total heating maintenance was a single dusting of the *gas* infra-red heaters. The *gas*-fired Perfection Schwank System keeps materials, floors, and machinery at a constant, uniform 70° — *an ideal temperature for employees.* What's more, the system is completely noiseless and draftless; prevents corrosion and maintains humidity at an optimum level for efficient production."

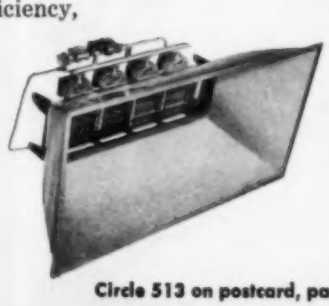
uninsulated buildings with total floor space of 180,500 sq. ft. and a total volume of 6,500,000 cu. ft.

Perfection Schwank Gas Infra-Red Heaters

As over 30,000 users have discovered, Perfection Schwank *Gas* Infra-Red Heaters give all the advantages of modern *gas* heat... high efficiency, precise control, speed, safety, cleanliness, dependability and unbeatable fuel economy.

Heat better for less with Perfection Schwank *Gas* Infra-Red Heaters. For complete information, contact your local Gas Company or write to Perfection Division of Hupp Corporation, licensee of American Infra-Red Radiant Co., 1135 Ivanhoe Rd., Cleveland 10, Ohio.

American Gas Association.



Approved by A.G.A., Underwriters, C.G.A. and C.S.A. Under Schwank U.S. Patents 2,775,294 and 2,870,830 and pending applications.

FOR INDUSTRIAL HEATING ...GAS IS GOOD BUSINESS!

Circle 513 on postcard, page 33

HEAVY DUTY SIDE TREADLE OPERATED FOOT SWITCH

Most versatile foot switch you've ever seen. Just by changing the position of a nylon cam, you can change the operation of the switch on the job. Comes with four nameplates (Start, Stop, Forward and Reverse). Pick the two you want, toss the other two.

HEAVY DUTY TREADLE SWITCH WITH FOOT LOCK Non-slip tread helps keep operator's foot from slipping. Available with several types of guards. Locks when depressed, opens when red release is touched.

HEAVY DUTY PALM-TYPE SWITCH Big orange surface easy to see. Rated for 600 volts maximum. Neoprene gasket stays flexible, resists effects of oil.

STANDARD DUTY TREADLE-OPERATED FOOT SWITCH Use it for a knee operation. Has a rating of 600 volts maximum. Three mounting bosses permit mounting on uneven surfaces without rocking.

Now! A new rugged line of versatile foot switches from Cutler-Hammer

Smartly styled... four types... designed to be used many different ways

Now you can get the same high quality in foot switches you find in Cutler-Hammer motor starters.

Our new foot switches are designed to be stepped on, kneed, elbowed, palmed or whatever method you can think of to use them. Heavy gauge metal and rugged construction will keep these switches operating long after others have failed.

You get versatility, too. The heavy duty, side treadle switch has three interchangeable operating arrangements that can be made easily in the field by just changing the position of a nylon cam, and all are styled alike to give you uniformity in appearance.

Be sure to get full details from your Cutler-Hammer distributor and send for Pub. LO-91-S274.

What's new at Cutler-Hammer?
We've geared up for the great growth of technology coming in this decade . . . with new, better products like the foot switches, new engineering talent, new plant facilities. If you're planning ahead, let's get together. Maybe we could help you with your electrical control and automation plans. Get in touch with the Cutler-Hammer Sales Office nearest you.

WHAT'S NEW? ASK...

CUTLER-HAMMER

Cutler-Hammer Inc., Milwaukee, Wisconsin • Division: Airborne Instruments Laboratory • Subsidiary: Cutler-Hammer International, C. A. • Associates: Cutler-Hammer Canada, Ltd.; Cutler-Hammer Mexicana, S. A.

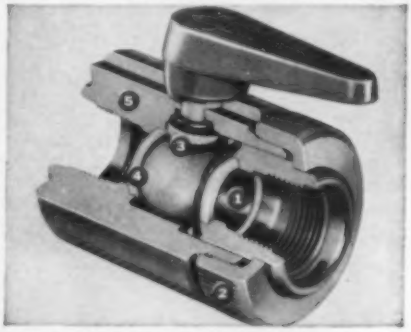
Circle 514 on postcard, page 33

NEW...
WALWORTH PVC BALL VALVE

...WITH REALLY LONG LIFE BUILT IN

Here's the ball valve that beats them all on longevity—the Walworth Polyvinyl Chloride Ball Valve. With its super-rugged construction, this valve is on the line to stay! □ When you handle tough, corrosive fluids, and want fast, tight shut-off get Walworth PVC Ball Valves. Your Walworth distributor can recommend from the most complete line of PVC Valves and fittings available today.

■ *Only Walworth offers all these long life features in a PVC Ball Valve:* **1. Full port opening.** Ball port is same nominal I.D. of the pipe itself. Full flow. Minimum turbulence. **2. Single-end, external adjustment.** Holds operating torque to the minimum. Ball rotates at a fixed location. Maintains alignment. **3. Rugged stem-to-ball construction.** Assures quick, positive shut-off every time. Built to last through 250,000 cycles ...equivalent of *80 years* of normal service! **4. Teflon seat rings.** Fully supported to provide leak-proof seating. High corrosion resistance. **5. Type I normal impact PVC.** Corrosion-resistant, non-aging. Non-toxic. Non-flammable. Extra rugged construction. Write for bulletin 196. • Walworth Co., 750 Third Ave., N. Y. 17, N. Y.

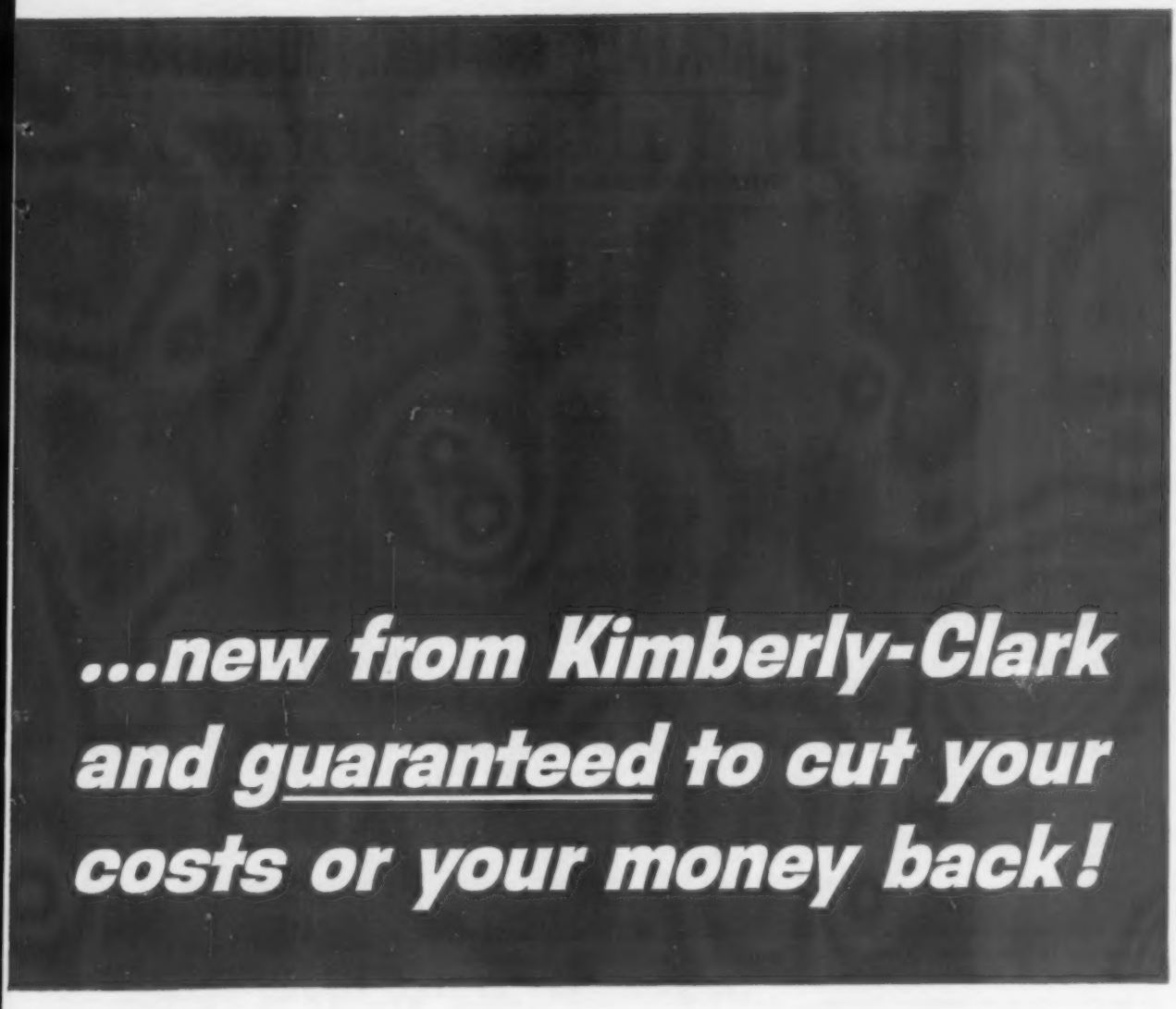


WALWORTH

The Walworth Companies: Alloy Steel Products Company • Conoflow Corporation • Grove Valve and Regulator Company • M & H Valve and Fittings Company • Southwest Fabricating & Welding Co., Inc.

Circle 515 on postcard, page 33

Kimtowels®
DISPOSABLE SHOP TOWELS



...new from Kimberly-Clark and guaranteed to cut your costs or your money back!

Your towel costs must come down or your money back!

Kimberly-Clark's 1-month guaranteed cost-cutting plan will prove to you that KIMTOWELS can reduce wiping costs. Here's how the plan works: you order a month's supply of Kimtowels. Use them in your entire plant (or in a single department) just as you would cloth wipers. At the end of one month, if your wiping costs haven't gone down, we will gladly refund the cost of the Kimtowels. Fair enough? Send coupon today.

- Look, feel, perform like cloth!
- Re-usable—like cloth!
- Far more economical than cloth!
- Strong, rugged—wet or dry!

plus—no rental; no collecting; no sorting; no storage; no records; no pilferage!

Kimberly-Clark Department No. PE-91, Neenah, Wisconsin

At no obligation to me, please rush information on the "GUARANTEED COST-CUTTING PLAN."

Name.....

Firm.....

Street.....

City.....Zone.....State.....

Circle 516 on postcard, page 33

FILLED TEFLON* BEARINGS

Chempro Filled-Teflon Bearings are tougher, harder, more wear-resistant and less subject to thermal expansion with the addition of specific filter compounds to virgin Teflon. Ideal for pumps, mixers, reactors and similar equipment where a chemically inert, non-corrosive, non-contaminating and non-adhering bearing material is a must.

Chemical & Power Products offers a complete Filled-Teflon Bearing service, including Chempro Finished Bearings either Pressed in Housings or without Housings, or Chempro Filled-Teflon Molded Tubes for machining bearings in your shop. Complete machining instructions furnished.

CHEMPRO FILLED TEFLON STYLES

FM-2	Glass-Filled Teflon
FM-3	Carbon-Filled Teflon
FM-4	Glass and Carbon-Filled Teflon
FM-8	Graphite- and Zircon-Filled Teflon
FM-9	Molybdenum Disulfide and Glass-Filled Teflon
FM-10	Mica- and Glass-Filled Teflon

Write for Bulletin CP-558.

*duPont trademark

CHEMICAL & POWER PRODUCTS, Inc.

7 Broadway, New York 4, N. Y.

Circle 517 on postcard, page 33

BACKTALK AND FORETHOUGHTS

Edited by Bea Berghorn

Preventive Maintenance Program

PLANT ENGINEERING:

"I would appreciate it very much if you would send me any information in regard to the setting up and function of a workable preventive maintenance program. We have been casting around for some time for such material and would appreciate any information you can furnish on this subject." *C. J. Moberg, Plant Engineer, Furnas Electric Co., Batavia, Ill.*

■ We have sent Mr. Moberg several articles that we feel may be of help to him.—*Editors.*

Seeks Advice on Infrared Heating

PLANT ENGINEERING:

"Always find something useful in PLANT ENGINEERING. This time it is the article 'How Lighting Affects Heating and Air Conditioning.' Would you please send me a reprint of it.

"Would you please give me some advice on infrared heating for use in a structural shop of 80,000 sq ft, with overhead cranes, high air changes and also some paint booths. I'd appreciate anything you might have on this type of heating." *John Gilroy, Director of Plant Engineering, Harnischfeger Corp., Milwaukee, Wis.*

■ We have supplied the reprints requested. We have also referred the reader to several sources for information on infrared heating.—*Editors.*

Care and Maintenance of Scientists

PLANT ENGINEERING:

"If possible I would like to procure 22 tear sheets of your article entitled 'The Care and Maintenance of Scientists.'

"It is one of the best I have read and I agree heartily with its contents.

"I will be glad to defray any reasonable expense involved." *G. W. Lees, Jr., Plant Engineer, Bell Telephone Laboratories, Murray Hill, N. J.*

PLANT ENGINEERING:

"I read with very much interest the article on 'Care and Maintenance of Scientists' in your June issue.

"As a good portion of our work here is with people of this caliber I am certain that this article would be invaluable to our first line supervisors and our maintenance force.

"Would you kindly forward to the attention of the writer a few tear sheets of this article." *Philip G. Graff, Plant Engineer, Stauffer Chemical Co., Chauncey, N. Y.*

PLANT ENGINEERING:

"Please send tear sheet of 'Care and Maintenance of Scientists' to my attention.

"Thank you for your promptness and courtesy." *Samuel Mendelsohn, General Manager, Line Electric Co., Orange, N. J.*

PLANT ENGINEERING:

"Kindly send us six copies of the article entitled 'The Care and Maintenance of Scientists' appearing in your June 1961 issue." *D. W. Englehorn, Wilbur Watson Assoc., Cleveland, O.*

1958 Article Still Available

PLANT ENGINEERING:

"We wish to obtain a reprint of a series of articles started in your issue of August 1958 by Mr. R. E. Wallin, covering the subject of preparing construction specifications and following through on letting the contracts, and job construction.

"Please advise if this series is still available, or, if not, where we might obtain comparable advice." *Howard W. Stevens, Plant Engineer, S. D. Warren Co., Cumberland Mills, Maine.*

■ Reprints of this series, "Construction Specifications" are available at $2.00 per copy. We have sent a copy to Mr. Stevens and we hope it will prove helpful.—*Editors.*

Agrees With Authors

PLANT ENGINEERING:

"May I commend you for the interesting article by Messrs. Fisher and Flynn on 'How Lighting Affects Heating and Air Conditioning.'

"Having been in the electrical construction and illuminating field for 58 years I am appreciative of the ever-increasing lighting standards.

"With the larger levels of illumination the quantity of heat generated by the sources of illumination has, until now, been given scant attention. The air conditioning engineer works independently of the illuminating engineer, so the heat generated by the lamps often becomes evident only after the room is occupied. Even in luminous

SILICONE NEWS from Dow Corning

Found: a paint that lasts

Silicone-based paints last longer; reduce maintenance time and costs

These two pictures emphasize the stubborn fight that maintenance coatings based on Dow Corning silicone resins put up against severe weathering conditions. Located in a northern industrial city, this water tower is constantly exposed to an army of paint killers — summer sun, winter sleet, smoke, rain, *plus* a corrosive chemical laden atmosphere.

At left, the tower is shown two years after it was painted with a conventional organic coating that withstood severe weathering during this period. Rust and corrosion marred its appearance and promised even greater damage. Using organic paints it was necessary to paint the tower at least every two years, a costly, almost continuous job.

Now, see how a silicone-based paint has cut this maintenance process in half. At the right, the tower is coated with an aluminum pigmented silicone-alkyd. But this paint job was done two years ago! The tower is still gleaming bright and completely protected. And maintenance men predict it will stay that way for several years more. The savings in time and money are obvious.

Beat high heat! Such a silicone-based coating can also be readily applied to surfaces that run hot, such as encountered on industrial stacks, mufflers, furnaces. Blistering, peeling, rust and corrosion are prevented; need for costly repainting and — in many cases — expensive replacement is greatly reduced.

Lasting colors, too. Silicone-based paints are now available in many colors . . . colors that stay put and don't fade. This means you can carry your color-coding on hot equipment for greater safety and efficiency while improving the overall beauty of your plant.

When you can have coatings like this — that last from 25% to 50% longer; that make plants and equipment look better, longer — don't you think you should find out more about them soon?

Send for your copy of "Why Silicone-Based Paints Mean Less Maintenance". Write Dow Corning Corporation, Department 0821, Midland, Mich.

first in silicones

Dow Corning

Circle 518 on postcard, page 33

IF YOU SPEND OVER

$1,000

A YEAR FOR ROLLS—

you can profit from S-W's technical bulletins.
Ask for the bulletins issued to date. Future copies will also be sent to you.

75th YEAR S-W INC.

more production from every cover
because of technical leadership

STOWE-WOODWARD INC.
Newton Upper Falls, Massachusetts
Neenah, Wisconsin • Griffin, Georgia
on the West Coast • HUNTINGTON RUBBER MILLS, INC.
Seattle, Washington • Portland, Oregon
Port Coquitlam, British Columbia, Canada

Circle 519 on postcard, page 33

BACKTALK—FORETHOUGHTS

ceiling installations little attention has been paid as to whether the open or closed systems of louvers were used. I am glad to note that the two authors have gone into this matter so thoroughly.

"I hope the architects will consider the requirements of specifying the type fixtures used in their air conditioning specifications so that proper use may be made of the amount of heat generated and that proper ventilation may be provided.

"Is it possible to get a reprint of this article?" *Leo Dolkart, Consulting Electrical Engineer, Chicago, Ill.*

■ Reprints of this article have been sent to Mr. Dolkart along with our thanks for his kind comments.—*Editors.*

Re Managing a PM Program

PLANT ENGINEERING:

"Will you please furnish me with 14 copies of the article 'Managing a PM Program' appearing in the July issue of your magazine. Thank you." *Ralph C. Brown, Chief Regional Engineer, Post Office Dept., Philadelphia Regional Office, Philadelphia, Pa.*

PLANT ENGINEERING:

"We would appreciate receiving several copies of your excellent article 'Managing a PM Program' in the July issue of PLANT ENGINEERING." *C. L. Shaw, Head, Plant Equipment and Facilities Branch, Long Beach Naval Shipyard, Long Beach, Calif.*

■ We are happy to furnish the tear sheets requested and still have a supply on hand for any other readers who are interested.—*Editors.*

Truck Article in Demand

PLANT ENGINEERING:

"Your article, 'Electric Trucks at Crane,' was of particular interest to me since we are starting our formal Preventive Maintenance Program and the material handling equipment is to be the first phase.

"Would you please send me the 'Truck Inspection Procedure' and any other information you have that might be helpful." *Aubrey O. Paradise, Industrial Engineer, Westinghouse Electric Corp., Athens, Georgia.*

■ In response to Mr. Paradise's request we have sent him a copy of 'Truck Inspection Procedure.' We also included a number of tear sheets on preventive maintenance that we hope will be of help to him. The reprint of the three-part truck article is available for 25 cents per copy.—*Editors.*

Permission Granted

PLANT ENGINEERING:

"I am writing a book on building maintenance. In your June issue of PLANT ENGINEERING there is an article entitled, 'Lubrication Guide for Packings and Seals'. I would like to have permission to use this as part of an article covering lubrication. If glossy prints or diagrams of the charts and figures used are available, I would appreciate having a copy of them.

"A credit line will be given for courtesies extended." *Thomas F. Sack, Building Superintendent, International Textbook Co., Scranton, Pa.*

■ We are pleased that Mr. Sack is using an article that appeared in PLANT ENGINEERING as a portion of his book, and gladly give our permission. Available artwork has been forwarded to him.—*Editors.*

Reprints Are Available

PLANT ENGINEERING:

"I would like to secure a copy of a section of the January 1961 issue of PLANT ENGINEERING. This section was marked Maintenance, and pertained to training.

"Could you tell me if a copy is available and what the charge would be to obtain the copy? I would appreciate hearing from you as soon as possible." *Edgar R. Linn, Field Representative, U. S. Department of Labor, Bureau of Apprenticeship and Training, Duluth, Minn.*

■ The section referred to is 'Maintenance Training and Procedures' which appeared in our January issue. It is free of charge and has been forwarded to Mr. Linn.—*Editors.*

Rooms A La Clean

PLANT ENGINEERING:

"We have recently heard of an article said to be in one of your 1960 issues that describes the latest practices in setting up a 'Clean Room'.

"This plant is located in Connecticut if my information is correct. Could you please send us one copy of the magazine describing this installation?" *J. E. McHugh, Lockwood Greene Engineers, Inc., Boston, Mass.*

■ The article Mr. McHugh is referring to is "How Clean Can You Get?" which was published in our February, 1960 issue. We have sent him a tear sheet of this article along with several others on the same subject.—*Editors.*

SAVE SPACE

WITH NEW GENERAL ELECTRIC SAFETY SWITCHES

Lugs for either copper or aluminum wire (60 to 600 amp.).

Bottom-hinged and front-operated for close ganging.

Visible blades are spring-reinforced to assure full, firm contact; minimum joints in current path; silver-plated copper parts; no fiber linkages in mechanism.

Clear ON-OFF indication from over 100 feet. Ratings plainly shown on permanent metal nameplate.

HEAVY DUTY ▲

▼ LIGHT DUTY

Safety phase barriers guard against accidental contact with live parts.

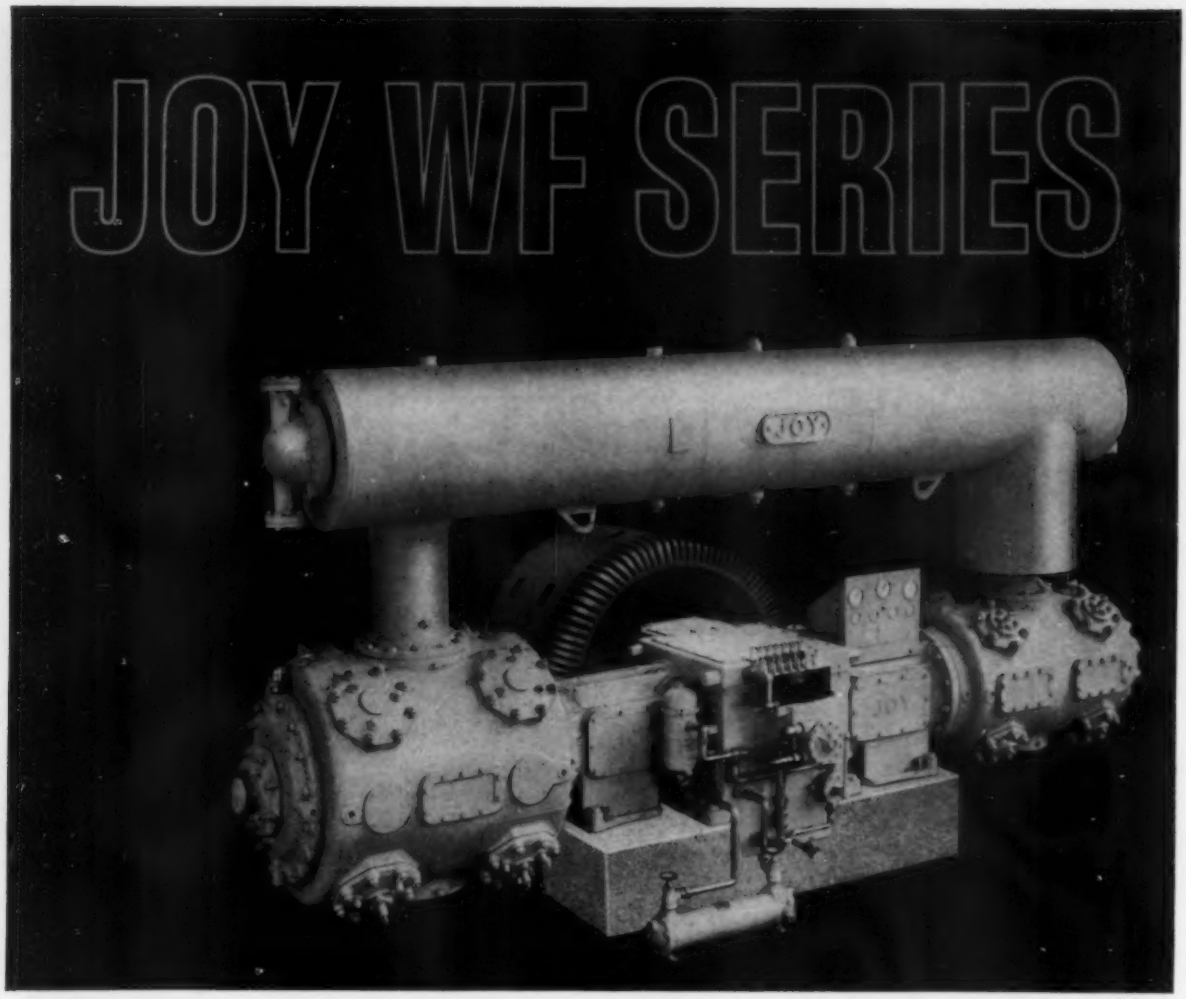
General Electric's new safety switches bring you important savings in space, longer service life, maximum safety and more economical installation. And Heavy Duty (Type A) switches sell at Normal Duty (Type C) price levels. Write for Bulletin CPD-74. See your nearest G-E distributor for a demonstration.

GENERAL ELECTRIC

Circuit Protective Devices Dept., Plainville, Conn.

Circle 520 on postcard, page 33

JOY WF SERIES



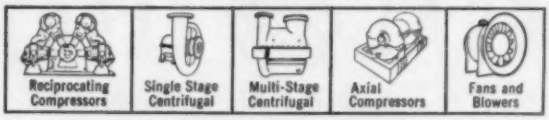
Announcing A Series of Horizontal Opposed Compressors in the 300-2000 HP Range

Designed for the great bulk of industrial air and gas applications, the WF series is the result of Joy's experience with over two and one half million compressor horsepower in the field. Every component is designed for dependability and ease of maintenance.

Installation and maintenance costs of the WF series are held to a minimum due to superior design. Since the motor rotor is mounted directly on the compressor shaft, alignment problems are minimized, installation is simplified, and less floor space is necessary.

The WF-102 air compressor pictured above has a displacement of 1972 CFM, and is driven by a 300 HP motor when discharging at pressures up to 125 PSIG. Larger models of Joy horizontal opposed compressors are also available as well as vertical, V-vertical, and turbodynamic machines. For additional information on the WF series write for Bulletin 3369-15.

AIR MOVING EQUIPMENT FOR ALL INDUSTRY



JOY

Joy Manufacturing Company
Oliver Building, Pittsburgh 22, Pa.

In Canada: Joy Manufacturing Company (Canada) Limited, Galt, Ontario

Circle 521 on postcard, page 33

BULLETINS

JUST RELEASED and OF IMMEDIATE PLANT INTEREST

MATERIALS HANDLING

Overhead Traveling Cranes

Performance advantages and applications of company's Series D overhead electric traveling cranes are detailed in 20-pp Bulletin 15005. Includes illustrations of bridges and trolleys, data on motors for crane and hoist service, magnetic controls. Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc.

For a copy, circle 101 on Post Card

Handling Equipment Summarized

Fork trucks, powered hand trucks, straddle carriers, towing tractors and other equipment are covered in this condensed, 20-pp Bulletin SP 4070. Brochure is divided by products into 12 sections, each containing illustrations and specification table. Industrial Truck Div., Clark Equipment Co.

For a copy, circle 102 on Post Card

Ideas in Materials Management

The "warehousing" approach to management of materials flow is explained in 16-pp Bulletin 2800. Illustrating equipment and techniques for live storage and transportation of raw materials and finished products, it offers ideas on application of warehousing science. The Rapids-Standard Co., Inc.

For a copy, circle 103 on Post Card

Bulk Material Handling Equipment

Catalog P-60 shows uses of pneumatic conveyors for ash removal in steam plants; collection, processing and reclamation of cutting oils, chips and borings in the metal working industry; and the handling of dry pulverized or granular materials. National Conveyors Co., Inc.

For a copy, circle 104 on Post Card

Vibratory Screens, Conveyors

Horizontal units are described in Bulletin B-100, 8 pp, illustrating true balanced-mass design and point-of-no-oscillation suspension. One section shows the self-adjusting eccentric drive, another how operations are improved. Comco Corp.

For a copy, circle 105 on Post Card

TOOLS, WELDING AND MACHINE SHOP

Industrial Power Tools

Among power tools featured in 96-pp Catalog AB-61 are 20-in. and 17-in. power feed drill presses, a 12-in. cut-off machine and a 7-in. standard grinder, in addition to drill presses, grinders, shapers, planers, jointers, metal and wood cutting lathes, saws. Selection tables included. Delta Power Tool Div., Rockwell Mfg. Co.

For a copy, circle 107 on Post Card

Vapor-Shielded Welding

Typical process applications of vapor-shielded arc welding, semi-automated Innershield Squirt and full automatic Innershield welders are pictured in this 12-pp bulletin. Comparative performance characteristics and process speeds are charted, construction and mechanical features listed. The Lincoln Electric Co.

For a copy, circle 108 on Post Card

How To Repair Worn Parts

Colorful 16-pp Bulletin MN 60, on manganese rods and weldments, gives instruction and welding tips for repairing and rebuilding worn parts. Sizes, prices and selection data included. American Manganese Steel Div., American Brake Shoe Co.

For a copy, circle 109 on Post Card

Flame Spray Applications

Brief reports on flame spraying applications are presented in this 9-pp data bulletin. Covers use in boiler feed pump casings, furnace parts, pump sleeves, circulating water pumps, valve rods, piston rods, stoker shafts. Metco, Inc.

For a copy, circle 110 on Post Card

CONSTRUCTION

Concrete and Mortar Guide

Publication X-6a covers job requirements and conditions, concrete floors, concrete in plastic and hardened state, curing and surface-after treatments considered when specifying concrete and mortar. The Master Builders Co.

For a copy, circle 111 on Post Card

Acid-Proof Cement Charted

This resistance chart for acid-proof cements (Bulletin 1) aids in selecting proper cement for corrosion-proof installations by listing over 75 corrodent solutions and rating the resistance to them of the various types of cement at 75 and 140 F. Acid-Proof Cement Manufacturers Assn.

For a copy, circle 112 on Post Card

Fire Protection Doors

Advances in design of fire door barriers and application of fire exit hardware are described in this 8-pp bulletin. Illustrates door styles and includes hardware selection chart and information on UL label requirements for hollow metal doors. Overly Mfg. Co.

For a copy, circle 113 on Post Card

Extruded Aluminum Louvers

Features, dimensions and suggested specifications for fixed louvers, operating louvers, special types and accessories are presented in this 20-pp 1961 manual on aluminum louvers. Construction Specialties, Inc.

For a copy, circle 114 on Post Card

MAINTENANCE

Data on Epoxy Coatings

Two technical bulletins give features, application suggestions and coverage of Capox A and Galvanox Type II. Bulletin 1A describes catalyzed epoxy coatings having good chemical resistance which can be applied over damp surfaces. Bulletin 4A describes a zinc-rich, electrically conductive coating in a catalyzed epoxy vehicle for severe industrial exposures as a replacement for hot dip galvanize type coatings. Subox, Inc.

For a copy, circle 115 on Post Card

Protective Industrial Cold Coatings

Product folders on six coatings tell what each does, where it is used. One folder describes Bitumastic 50, an extra-heavy thioxtropic coating for steel structures and equipment exposed to severe corrosion environments. Another describes Bituplastic 28, a heavy-bodied coal-tar emulsion for outdoor protection. Other folders cover Bitumastic Super-Service Black, a coal tar pitch material; Bitumastic Black Solution, a general maintenance coating; Bitumastic tank solution; and Bitumastic Hi-Heat Gray. Tar Products Div., Koppers Co., Inc.

For a copy, circle 116 on Post Card

Commercial literature reviewed on these pages can keep you posted on what's available in plant engineering equipment. To order, use the Reader Service Cards on page 33.

Polyethylene Pipeline Coating

Bulletin 201 covers physical and electrical properties of X-Tru-Coat, a high-density polyethylene coating which is bonded to steel pipe by hot-applied "live" adhesive. Hill Hubbell Co.

For a copy, circle 117 on Post Card

For Better Steam Cleaning

Concise data on methods and materials used in steam-detergent cleaning are presented in this booklet, gives cleaning tips, a list of essential detergent properties, and technical specifications of Hurriclean steam-detergent gun and lightweight Steam Pistol. Oakite Products, Inc.

For a copy, circle 118 on Post Card

Descaling of Boilers

Advantages of controlled chemical descaling of boilers are outlined in Service Bulletin 40B. Outlines materials used for descaling, procedure, safety. Oakite Products, Inc.

For a copy, circle 119 on Post Card

BULLETINS

(Begins on page 31)

VALVES, PIPING, FITTINGS

Rubber Seat Butterfly Valves

Details on rubber seat butterfly valves with adjustable seat feature are presented in Bulletin 6. Covers models from 3 to 144 in., for pressures from 150 psi. The Henry Pratt Co.

For a copy, circle 120 on Post Card

Surge Arrestor Valve

Cushioned valve designed to automatically open main valve for abnormal or subnormal pressure surges or electrical power failure is described in Bulletin W-16, 16 pp. Complete technical details and drawings included. Golden-Anderson Valve Specialty Co.

For a copy, circle 121 on Post Card

Ductile Iron Pipe Fittings

Catalog 3PF, 12 pp, illustrates pipe fittings, bushings and plugs, showing available stock sizes, prices, pressure ratings and standard specifications met. Includes data on strength, ductility, impact and corrosion resistance. The Kuhns Bros. Co.

For a copy, circle 122 on Post Card

Flexible Pipe Connector Guide

Analysis of flexible pipe connectors, their application, design, and handling is presented in 16-pp Manual AM-9. Includes sections on interpreting specifications, avoiding connector failures, installation, and a check list for selecting correct units. Allied Metal Hose Co.

For a copy, circle 123 on Post Card

Improved Industrial Strainers

Illustrated and described in 24-pp Catalog 61 are Y and basket patterns, with semi-steel, cast steel, bronze and stainless steel bodies and perforated sheet metal and woven metal wire mesh screens. Includes free area to pipe ratios and pressure drop charts. O. C. Keckley Co.

For a copy, circle 124 on Post Card

VENTILATING AND AIR CONDITIONING

Compact Roof Ventilator

Engineering data is contained in Bulletin CV61 on Centridyne low silhouette centrifugal ventilator. Performance and construction specifications are given. Photos and diagrams detail aerodynamically designed extruded aluminum discharge vanes. Western Engineering & Mfg. Co.

For a copy, circle 126 on Post Card

Industrial Fans

Bulletin A-1203, 44 pp, describes HS fans, Series 81, Class I and II. Covers construction features, drive arrangements, configurations and types of drive. Components are discussed and illustrated. Capacity tables are provided for all 12 sizes, both single-inlet single-width and double-inlet double-width. Outline-type drawings are keyed to tabulated dimensional data. American-Standard.

For a copy, circle 127 on Post Card

Central Air Conditioning

In addition to general and mechanical design data on central air conditioning units, 60-pp Catalog 560 offers detailed information on unit type and size, cooling and heating coils, accessories and determination of fan speed and motor hp requirements. Selection charts and dimensional data included. McQuay, Inc.

For a copy, circle 128 on Post Card

PUMPS, COMPRESSORS

Guide to Centrifugal Pumps

Installation, servicing and maintenance of centrifugal pumps is covered in 18-pp Bulletin G-2971. Information includes storage, foundation construction, alignment, piping, priming and starting, lubrication, trouble-shooting and inspection. Worthington Corp.

For a copy, circle 129 on Post Card

End-Suction Centrifugal Pumps

Close-coupled end-suction centrifugal pumps are featured in 8-pp Bulletin 108. Selection and dimensions charts included, as well as limitations chart and specifications. Aurora Pump Div., The New York Air Brake Co.

For a copy, circle 130 on Post Card

High Vacuum Vapor Pumps

Comprehensive data on performance characteristics and selection of high vacuum vapor pumps is presented in 56-pp Bulletin 6-1. Applications in high vacuum technology are detailed, procedures for measuring performance of high-vacuum pumps discussed, and speed-pressure curves included. Consolidated Vacuum Corp.

For a copy, circle 131 on Post Card

Space-Saving Compressors

Horizontal opposed compressors in the 300 to 2000 hp range are described in Bulletin A-74, showing construction features and standard sizes to 125 psig. Joy Mfg. Co.

For a copy, circle 132 on Post Card

PACKINGS, SEALS

Quality Leather Packings

Hydraulic, pneumatic, packings in a variety of sizes and shapes, including U, cup, V, flange, gaskets and washers, are described in 12-pp Form AD-186. Complete tannage, impregnation information, design data, installation procedures, allowable clearances covered. Garlock Inc.

For a copy, circle 134 on Post Card

Molded Packing Selection Aid

Catalog MP-361, 8 pp, describes packings for maintenance of presses, pumps, compressors, and hydraulic and pneumatic equipment. Tables list composition of packings for use with various fluids and temperatures, recommended types for most common machinery, Greene, Tweed & Co.

For a copy, circle 135 on Post Card

For Hydraulic, Pneumatic Service

Specifications and applications of rubber, rubber and fabric, leather and Teflon molded cups for hydraulic and pneumatic service are given in revised Bulletin AD-189. Contains photos and charts. Garlock Inc.

For a copy, circle 136 on Post Card

Improved Hydraulic Seal

Characteristics and advantages of company's SCN-rings consisting of flexible oil-resisting synthetic rubber sealing element, bonded to two concentric laminated fabric backing rings are outlined in 12-pp Bulletin R28/6102. Bestobell (Canada) Ltd.

For a copy, circle 137 on Post Card

HEATING

Radiant Environment

Electric infrared radiant heat is explained in Form 61 containing application illustration—both indoors and out. Factors include—low equipment installation, maintenance and operating cost. Fostoria Corp.

For a copy, circle 138 on Post Card

Gas-Fired Make-up Air Units

Over 40 models of direct gas-fired units, for rooftop, ceiling and wall mounting, are depicted in this 12-pp Bulletin 101. Also shown are accessories and burner sections. Metals Engineering & Mfg. Co., Inc.

For a copy, circle 139 on Post Card

Designing for Make-Up Air

Handbook DF-200, 8 pp, discusses the need for make-up air systems, how to design them and select component equipment, and basics of designing control arrangements. Applicable duct furnaces and blower assemblies covered. Reznor Mfg. Co.

For a copy, circle 140 on Post Card

DUST, FUME CONTROL

Heavy-Duty Air Cleaners

Catalog 1435, 6 pp, describes the Model PD Precipitron electronic air cleaner with push-button control. Principles of operation, construction features, selection data and specific application arrangements are illustrated. Westinghouse Electric Corp.

For a copy, circle 141 on Post Card

On Handling Corrosive Fumes

How to handle corrosive fumes with fans, air washers, and exhaust systems made of unplasticized Type 1 PVC is detailed in 36-pp Catalog F. Includes dimensional diagrams, performance tables and PVC chemical resistance table. Industrial Plastic Fabricators, Inc.

For a copy, circle 142 on Post Card

(More Bulletins on page 226)

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Hermetic... they're Leakproof !

NEW 'BUFFALO'

CAN-O-MATIC® *PUMPS*

with self-adjusting bearings

Now, from Buffalo Pumps, a leakproof line of totally enclosed hermetic pumps so simple in design they can be taken apart and re-assembled with open-end wrenches and a screwdriver.

Designed for the chemical, petrochemical, atomic energy, and marine industries, the new Can-O-Matic's are the most practical, durable and easily maintained pumps in the hermetic field.

Long-life bearings represent a great new advance in canned pump design. Lubricated by the liquid being pumped, they absorb both radial and axial thrusts... automatically compensate for bearing and journal wear. Toxic or volatile, liquids cannot escape... air cannot leak in.

Thirteen sizes with 1" to 5" discharges are now available for a wide range of applications. Standard units with stainless steel rotor cans are designed for 120 psig and 40° through 250° F. operations. Special models are available for higher pressures and temperatures, and a variety of dangerous corrosive liquids.

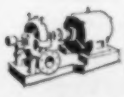
For additional information and specs, contact your resident Buffalo representative, or write direct for Advance Bulletin 977.

"Buffalo" PUMPS

BUFFALO PUMPS DIVISION
BUFFALO FORGE COMPANY
Buffalo, New York
CANADA PUMPS LTD., KITCHENER, ONT.

'Buffalo' Air Handling Equipment to move, heat, cool, dehumidify and clean air and other gases.

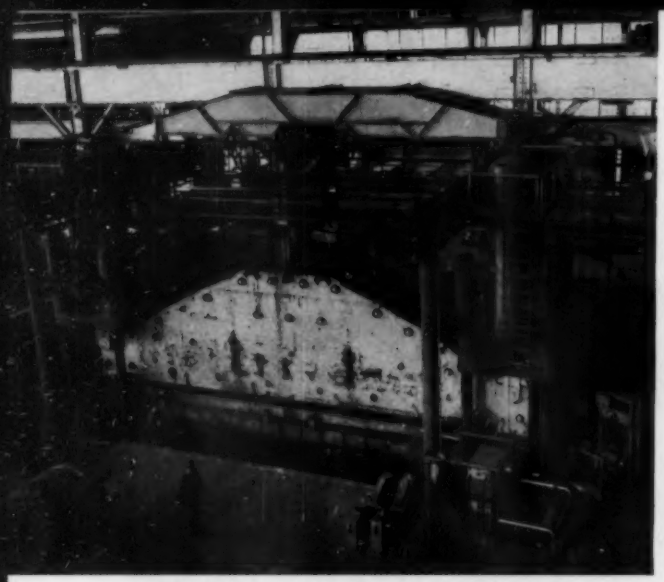
'Buffalo' Machine Tools to drill, punch, shear, bend, slit, notch and cope for production or plant maintenance.



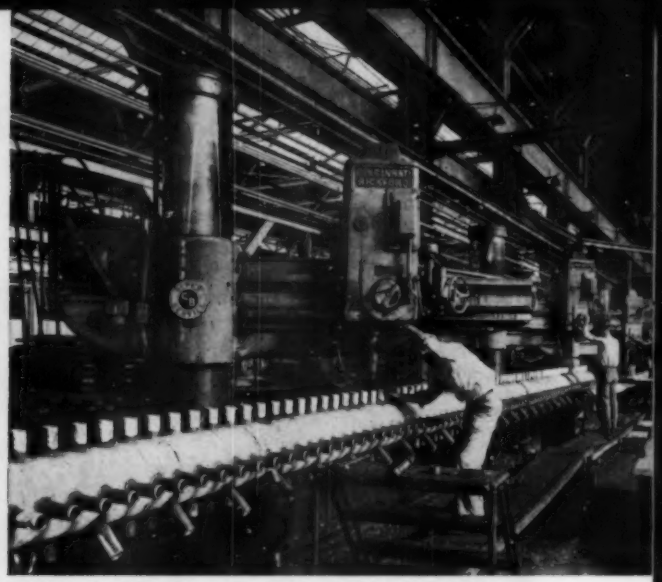
'Buffalo' Centrifugal Pumps to handle most liquids and slurries under a variety of conditions.

Squier Machinery to process sugar cane, coffee and rice. Special processing machinery for chemicals.

Circle 522 on postcard, page 33

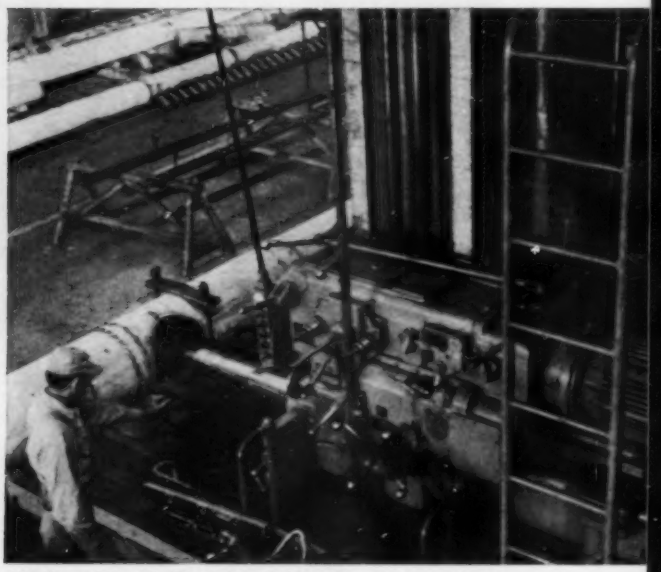


Overhead view of 2500-ton press. It forms heavy steel plate for drum shells—up to 7 inches thick, up to 30 feet long. Gulf Harmony 61 is used in the hydraulic system.



Cincinnati Bickford radial drill presses — working on headers. Gulf Harmony 61 is used in column mechanism, drill-head mechanism and main drive gear boxes. Gulf Precision Grease is applied to fittings.

Colburn Vertical Boring Mill—milling a drum head. Gulf Harmony 61 is used in the circulating system for main drive gears; in the reservoir for feed change gears.



Giddings & Lewis 6" horizontal boring machine—boring hole in header. Gulf Harmony lubricates the column slides and screws on this new machine.

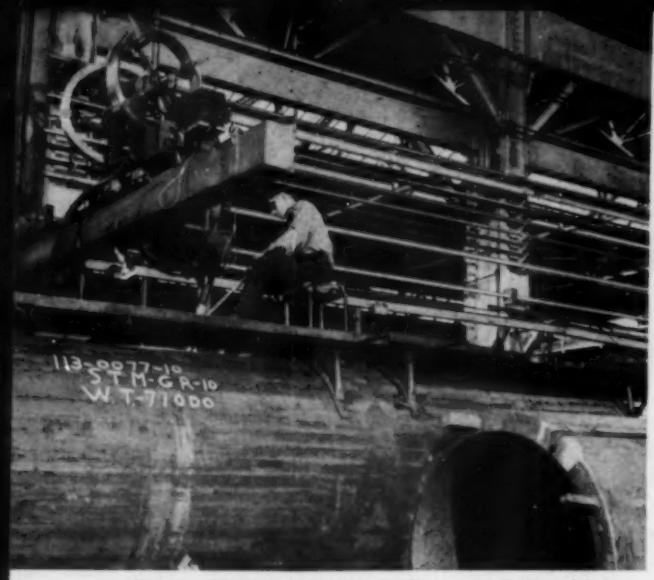
Simplified lube program helps Babcock 16 lubricants to just 7...

The Paris, Texas, plant of Babcock & Wilcox specializes in the manufacture of steam generating equipment. Typical examples: 65-ton boiler drums and 4-ton tube sections.

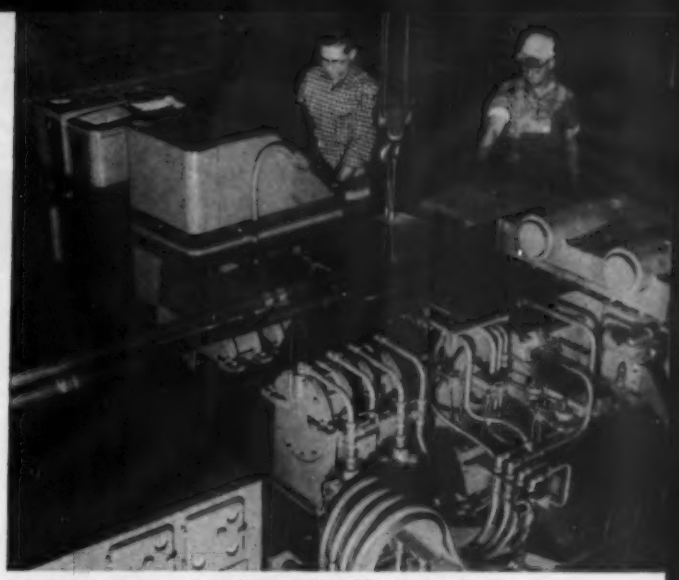
Recently, Gulf Sales Engineers conducted a lubricant survey in this plant. As a result, lubes were reduced from 16 to 7. This reduced the possibility of application errors and simplified ordering, bookkeeping and handling.

"It's important to keep lube recommendations up to date," says C. C. Eagon, Master Mechanic. "We call in lubrication engineers as new machines arrive. And they help us translate the manufacturer's lube recommendations in terms of their oils and greases."

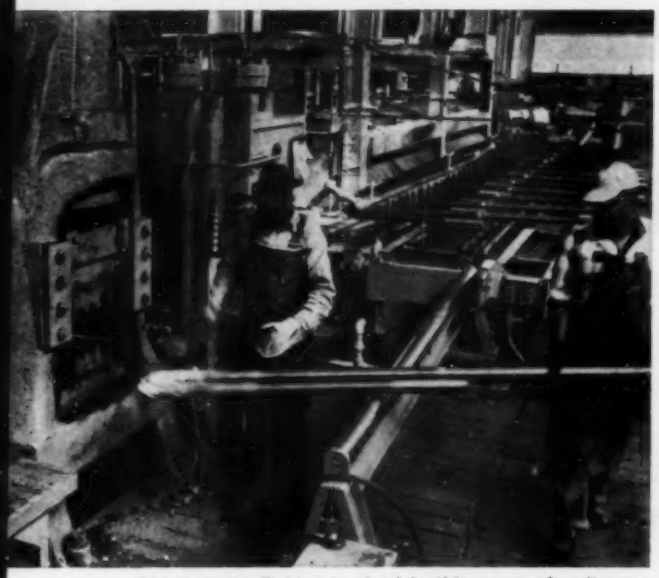
The seven recommended grades are really four basic types of Gulf oils and greases. First, Gulf Harmony® oils—highly stable lubricating oils with excellent water separating properties; inhibited against



Automatic submerged arc welder is used to weld drum halves together, Gulf Precision Grease and Gulf E.P. Lubricant 95 protect bearings and gears of this machine against excessive wear.



Tubes joined together in butt-welder. The hydraulic system reservoir is filled with Gulf Harmony 44. Gulf Harmony 61 is used in milling machine gear box. Gulf Precision Grease lubricates guide shaft bearings.



Sizing press. Tubing is sized in this press after it goes through swedging, upsetting and bending operations. Ways and shaft bearings are lubricated with Gulf Precision Grease, from central greasing system.

Works Manager R. L. Reed (left) talks with Frank P. Mauro, Gulf Sales Engineer. The drums behind them are being shipped to a new power plant in Santos, Brazil.

& Wilcox reduce
GULF MAKES THINGS RUN BETTER!

rust and corrosion. Next, Gulf E.P. Lubricants—used where shock loads and high pressures are factors. These superb lubricants are non-foaming, noncorrosive and extremely stable. Thirdly, Gulf Lubcote®—tough and tenacious. It protects against wear. And it cushions the sliding and rolling of gear teeth. Lastly, Gulf Precision Grease—a general purpose ball and roller bearing grease to satisfy the plant's grease-lubrication demands.

Simplify your lube inventory with versatile Gulf multipurpose lubricants. And see for yourself how Gulf makes things run better! Just call a Gulf Sales Engineer at your nearest Gulf office. Or write for information.

GULF OIL CORPORATION
Dept. DM, Gulf Building
Houston 2, Texas

GULF

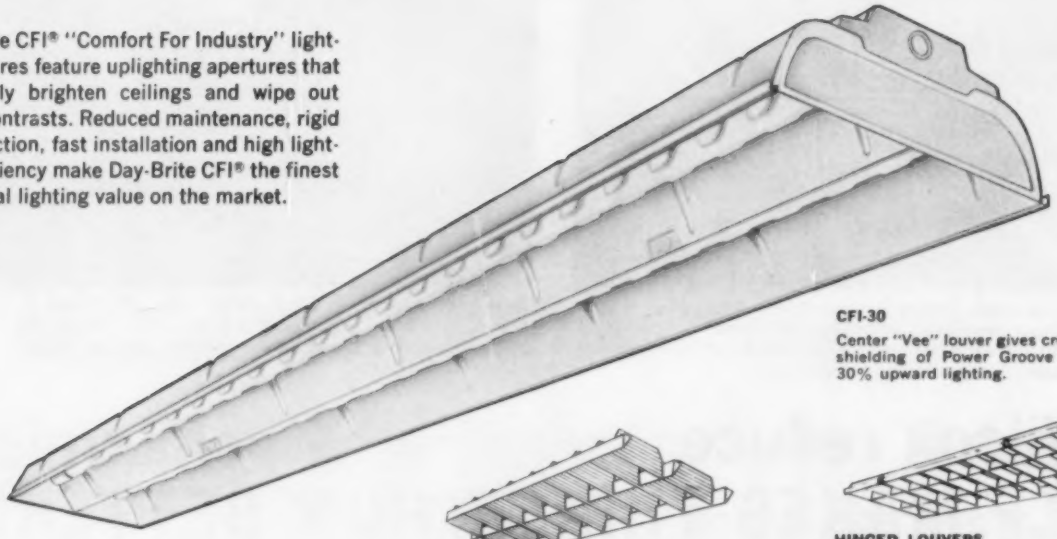
Circle 523 on postcard, page 33

Whatever your reasons for wanting

- ☐ Increase production
- ☐ Avoid mistakes
- ☐ Utilize space better
- ☐ Prevent accidents

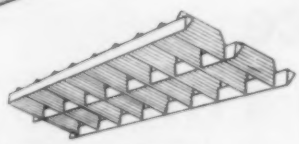
...you'll find the answers in

Day-Brite CFI® "Comfort For Industry" lighting fixtures feature uplighting apertures that cheerfully brighten ceilings and wipe out harsh contrasts. Reduced maintenance, rigid construction, fast installation and high lighting efficiency make Day-Brite CFI® the finest industrial lighting value on the market.



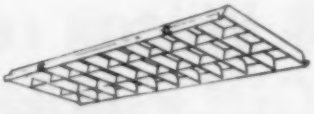
CFI-30

Center "Vee" louver gives crosswise shielding of Power Groove lamps. 30% upward lighting.



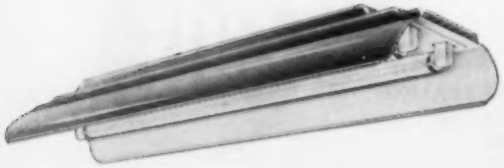
HINGED ALZAK ALUMINUM PARALOUVERS®

Provide the ultimate in visual comfort. Use with CFI-25 and CFI-30 fixtures. PARALOUVER Patent Nos. 2633799 and 507541.



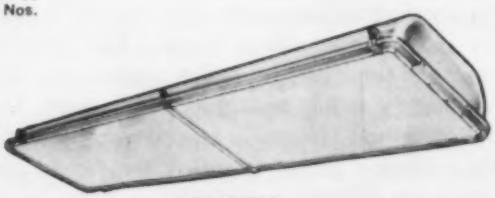
HINGED LOUVERS
(Baked white finish)

Use for critical seeing tasks requiring additional shielding, with CFI-10, CFI-15, CFI-25 or CFI-30 fixtures.



RS-240-TT

For Rapid-Start lamps. Economy . . . with quality features.



VAPOR-TIGHT

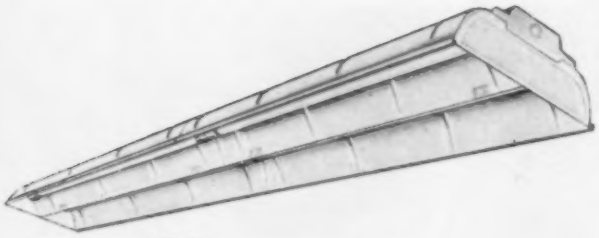
Use where fixtures are exposed to moisture or where non-combustible dust is present. Vinyl gasketed frame. Uses Rapid-Start lamps.

Circle 524 on postcard, page 33

to improve your plant lighting

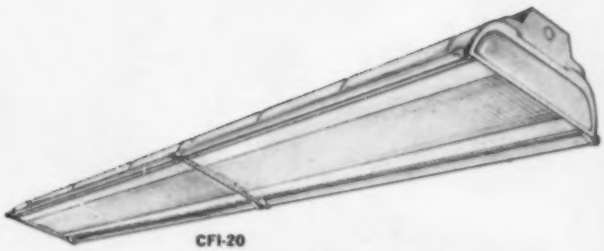
- ☐ Improve morale
- ☐ Reduce employee fatigue
- ☐ Improve housekeeping
- ☐ Impress visitors

the complete Day-Brite line



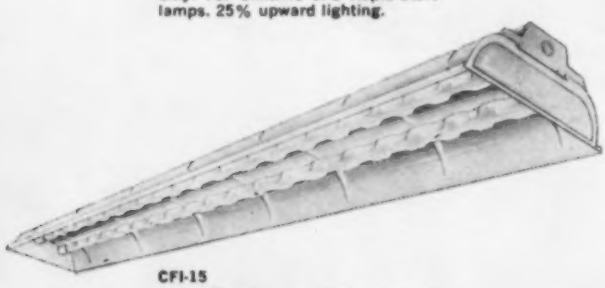
CFI-25

Excellent visual comfort and economy. For Slimline and Rapid-Start lamps. 25% upward lighting.



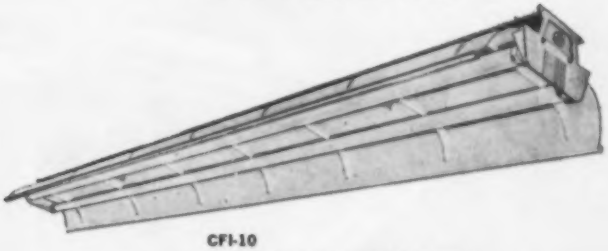
CFI-20

Power-Groove lamps with minimum glare. Cleartex® bottom panel reduces reflection from shiny work surfaces. 23% upward lighting.



CFI-15

For Power-Groove lamps. Closed ends, rigid rib construction. 15% upward lighting.



CFI-10

For Slimline and Rapid-Start lamps. Provides 10% upward lighting through die-embossed apertures.

Get your FREE 16-page "Guide to Modernization and Relighting"

Tells how to estimate your lighting needs for increased production and profit. Includes current recommended illumination levels and photographs of actual modern applications. Write: Day-Brite Lighting, Inc., 6260 N. Broadway, St. Louis 15, Mo.

DAY-BRITE

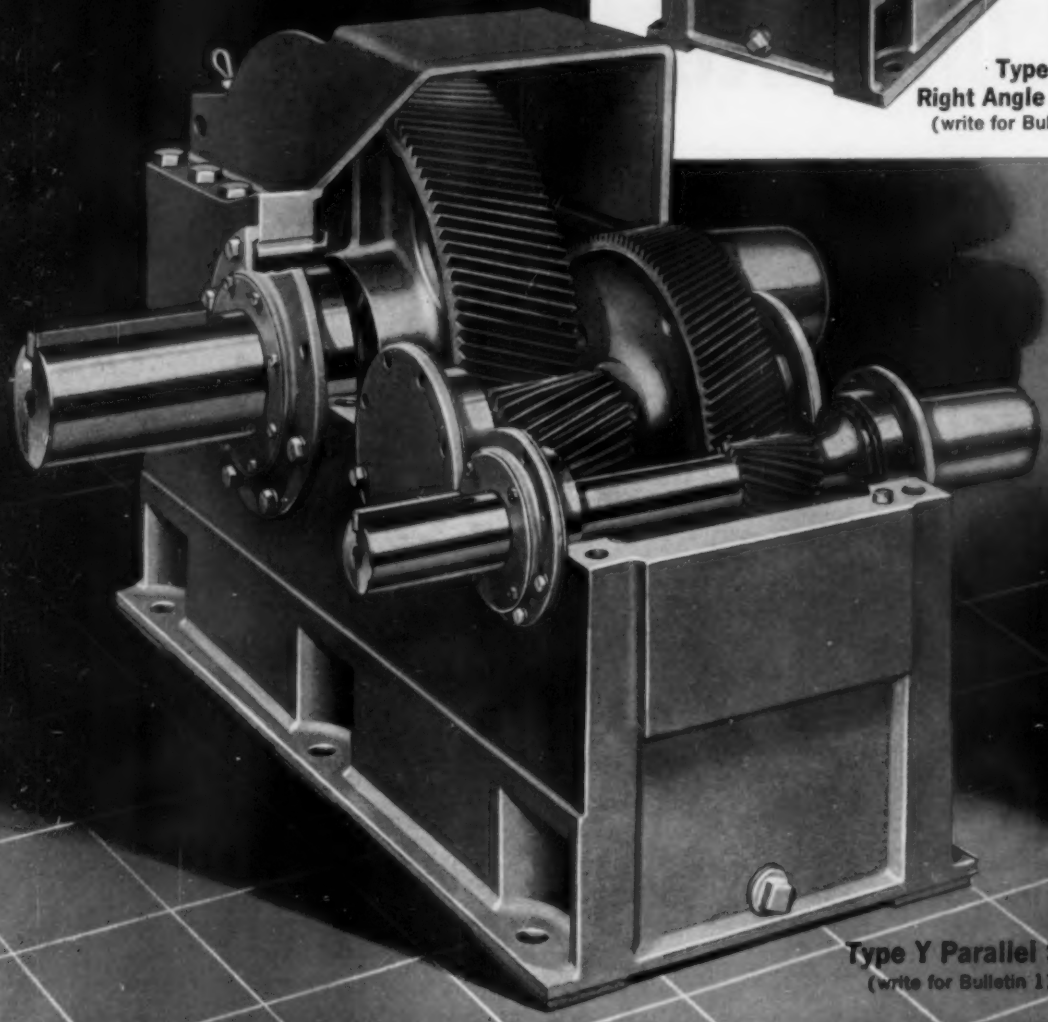
Day-Brite Lighting, Inc., St. Louis, Mo., and Santa Clara, Calif.
In Canada: Amalgamated Electric Corp., Ltd. Toronto 8, Ont.

NATION'S LARGEST MANUFACTURER OF COMMERCIAL AND INDUSTRIAL LIGHTING EQUIPMENT

FALK INTRODUCES 2 NEW SERIES OF VERSATILE SPEED REDUCERS

Designed to serve industry's current and future requirements

Type YB
Right Angle Horizontal
(write for Bulletin 2100)



Type Y Parallel Shaft
(write for Bulletin 1100)

Parallel Shaft and Right Angle Horizontal Reducers cataloged thru 1,570,000 lb-in. torque at low speed shaft ...larger units upon request. Ratios 1.84 thru 292 to 1 for parallel shaft; 5.06 thru 1207 to 1 for right angle horizontal

These new units are probably the most thoroughly engineered speed reducers on the market today. Final designs based upon years of development study and a background of 50 years experience make these units as dependable as the name "FALK". A few of their many features are...

PINPOINT APPLICATION COVERAGE Wide choice of sizes and ratios permits the most economical selection of a correctly rated unit for each application. In each series of parallel shaft and right angle reducers, cataloged sizes range up to 1,570,000 lb-in. torque at the (11 inch dia.) low speed shaft. (Other standard designs to 25,000,000 lb-in. torque; custom designs for higher capacities.)

UNMATCHED VERSATILITY The "Basic Y" speed reducer design permits economical modification to meet a multitude of specific requirements. Smooth, flat surfaces simplify mounting of motor brackets, backstops, brakes, and any number of other accessories.

RUGGED HOUSINGS Sturdy housings not only provide maximum rigidity to maintain proper alignment of gearing, but also have the strength to support heavy overhung loads and withstand accidental blows.

DEPENDABLE FALK GEARING Gears are selected with the proper proportions and hardness to provide the optimum combination of maximum durability and strength for high shock as well as uniform loads.

BEARINGS TO SUIT THE OVERHUNG LOAD Standard reducers can meet custom-built requirements with optional stock bearings and shafts (at only a nominal extra charge.) Maximum overhung load capacities are so great that for some conditions, still within the capacity of the reducer, extra strong supporting foundations and bolts must be provided.

DOUBLE GEAR LIFE Standard double ended shafts can be reversed end for end to bring into contact the unused surfaces of the gear teeth for twice the normal gear life.

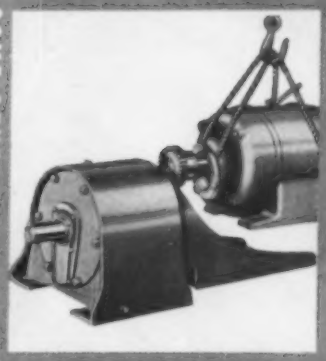
SEALS FOR ALL CONDITIONS Standard equipment oil seals assure oil-tight and dirt-free gear units for normal applications. Standard abrasive and moisture-resistant seals available upon order.

THE FALK CORPORATION, MILWAUKEE 1, WISCONSIN

MANUFACTURERS OF QUALITY GEAR DRIVES AND FLEXIBLE SHAFT COUPLINGS

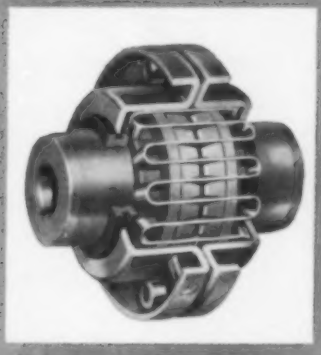
Representatives and Distributors in most principal cities

SOME OTHER MEMBERS OF AMERICA'S FIRST FAMILY OF POWER TRANSMISSION PRODUCTS



ALL-MOTOR MOTOREDUCERS

SHAFT MOUNTED DRIVES



STEELFLEX COUPLINGS

FALK

A GOOD NAME IN INDUSTRY

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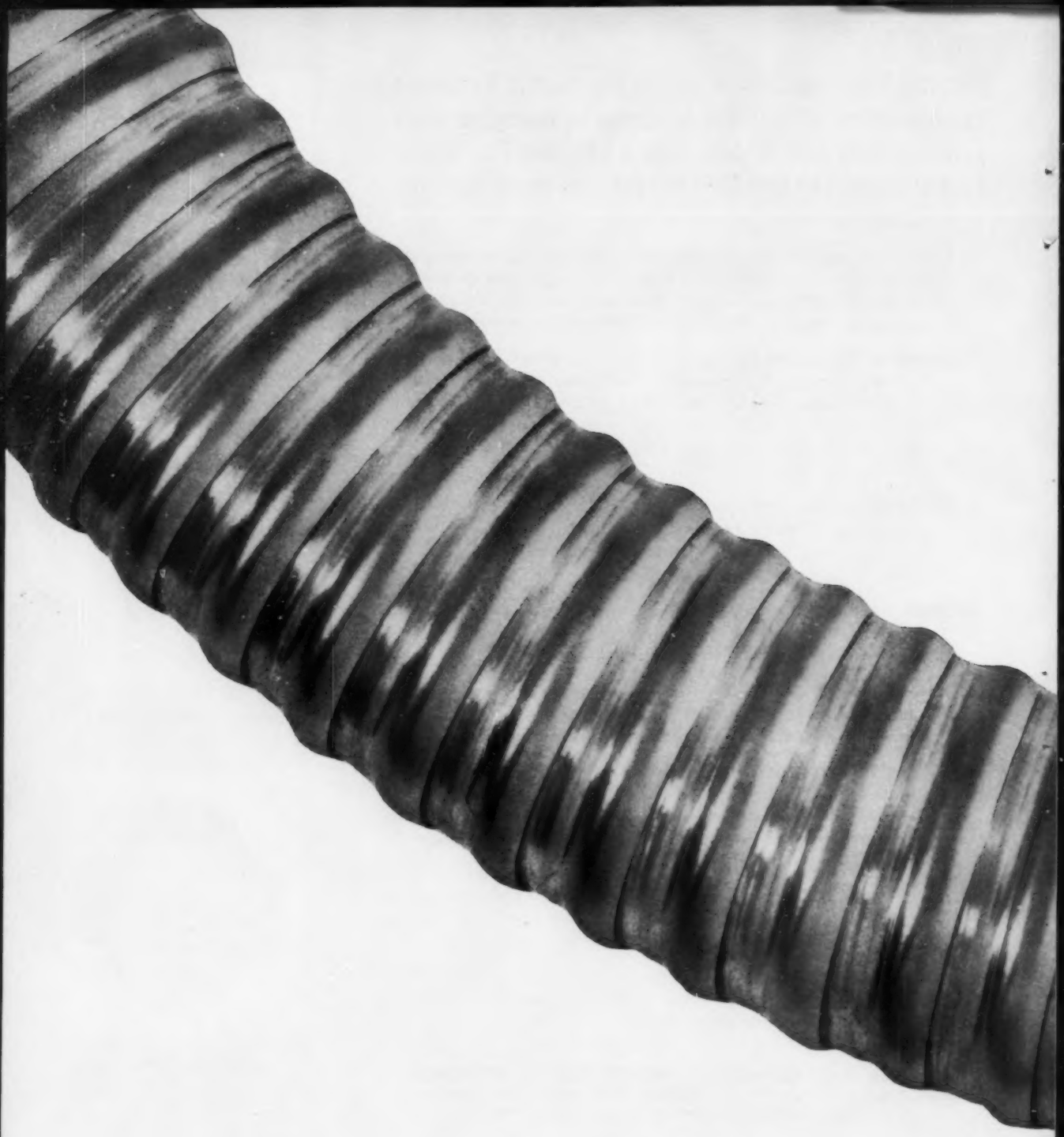
Circle 525 on postcard, page 33

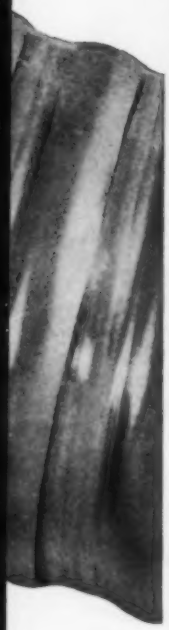


American Steel and Wire
Division of
United States Steel

Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors
Tennessee Coal & Iron Division, Fairfield, Alabama, Southern Distributors
United States Steel Export Company, Distributors Abroad

Cut corners with flexible USS Armorlokt Cable

Remember your last conduit job . . . all the time and work needed to install junction boxes, not for new circuits but just so the cable could be pulled around corners? And the longer the pull, the more boxes you needed. USS Tiger Brand Armorlokt Cable could have been installed in approximately one-half the time and eliminated all that expensive pipe fitting and bending. ■ Armorlokt installs as easily as ordinary cable—yet it protects as well as rigid conduit, and sometimes even better because Armorlokt is flexible and "rolls with a punch." You can install it anywhere . . . up, down, across walls, buried in the ground, suspended in trays or on cable rings, indoors or outdoors. Armorlokt can be installed in long lengths, because its flexible construction permits easy and quick bending around corners, I-beams, or any other obstruction. And you can easily splice into Armorlokt Cable, anywhere along the entire length. ■ Armorlokt has a higher current-carrying capacity than the same size conductor in conduit because heat is quickly dissipated, not trapped inside. Corrosive atmospheres are no problem. Armorlokt is available with galvanized steel, stainless steel, aluminum or bronze armor. It's also available with an Ampyrol (PVC) jacket, in black or colors for easy identification. You can order Armorlokt with almost any kind of insulation, including varnished cambric, rubber, or asbestos up to four inches in diameter, rated 15,000 volts. ■ There's a standard USS Tiger Brand cable for every special job. For the complete story on Armorlokt Cable or any other type cable, call our nearest sales office or write American Steel and Wire, Dept. 1281, Rockefeller Building, Cleveland 13, Ohio.



USS, Armorlokt and Ampyrol are registered trademarks

Circle 526 on postcard, page 33

PLANT ENGINEERS' DIGEST®—so those who rush may read and know what's new

Edited by Bea Berghorn

Vector Method of Over-all Magnetization Speeds Inspection

IN ORDER to reduce magnetic particle inspection time on large castings from days to hours, and at the same time increase reliability of test results, a new testing machine has been installed at Birdsboro Corp., Birdsboro, Pa.

The new nondestructive testing machine, built by Magnaflux Corp., employs the vector method of over-all magnetization in conjunction with a fluorescent wet inspecting medium.

Checking a 2600-lb, low-alloy steel casting of gear-type design was the first application of the new equipment. These parts had created a bottleneck in the inspection station when the conventional cross-prod and dry-powder techniques with portable units were used.

Small internal fillets and cored openings contributed to the difficulty of the older method. It was necessary to operate two machines, each manned by two operators on an around-the-clock basis to meet delivery commitments.

Inspector sprays fluorescent wet agent on casting prior to inspection.

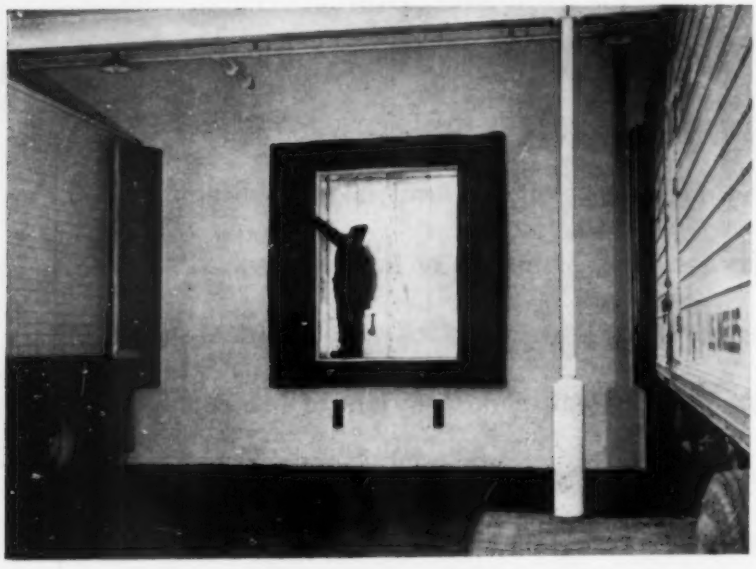
Black light helps detect any defects in internal fillets or cored openings.

New equipment was installed, consisting of an 8000 amp, three phase, full wave, direct current, type CRV-8 power pack unit. Machine capacity is considered adequate for sectional and over-all magnetization of castings up to 25 tons.

Magnetizing method, depending on configuration of the casting, accomplishes over-all magnetization by directing separate currents through each of three circuits. While only one magnetic field may exist at one time in one part, the purpose here is cyclic three-way magnetization in three planes.

During the period of "continuous" magnetization, which the operator controls with a remote switch, he sprays the casting surfaces, using water as the suspending agent. Black light is used to facilitate inspection. This fluorescent wet method has proved much more economical than for former dry-powder method. There is no recovery problem involved with the water vehicle medium, and inspection has been reduced to less than 20 minutes for one man, compared to seven man-hours required by the previous method. *From a release of Birdsboro Corp., Birdsboro, Pennsylvania.*

Foam-Rubber Seal Guarantees Even Temperatures



Loading and unloading of frozen food and frozen ingredients are accomplished with no loss of below-zero air, even in hot weather, with the new loading facility at Carnation Company's Simple Simon pie plant in Torrance, Calif. A foam-rubber seal surrounds the dock doors of the plant's cold room, forming an airtight compartment when standard refrigeration vans are backed against the rubber seal. This has the effect of converting the van's interior and the plant, with its minus-zero temperature, into one continuous area. (From a release of Carnation Co., Torrance, California.)

Outside Hoist Saves Space, Money

TRAFFIC congestion in various departments and overcrowded freight elevators are problems common to many industries.

Outside elevating of materials

From Crouse-Hinds, originator and leading manufacturer of electrical conduit fittings, comes the new "Mark 9" line. Die-cast, copper-free aluminum. The ultimate in protection, and ease of installation. Compare with any other die-cast conduit fitting—and you'll choose no other.

Smooth and lightweight with the trim good looks that die-casting imparts.

More wiring room inside is provided by new cover-opening. Compare with others and see.

Rugged and corrosion-resistant because it's die-cast of copper-free aluminum, resistant to corrosion.

Easy to install, with self-retaining cover screws, smooth integral bushing, taper-tapped threads, longer grip-sure hubs.

Full range of types and sizes, from ½" to 4".

Complete selection of wiring devices.

Neoprene gaskets for greater resistance to oil a i chemicals; with perforated tear-out centers where open gaskets are needed for wiring devices.

UL-listed; CSA-approved, made to Crouse-Hinds high standards of quality and inspection.

Competitively priced. Ask your Crouse-Hinds Distributor.

For complete "Mark 9" details, write for Bulletin #2730 or contact your Crouse-Hinds Office.

CROUSE HINDS

REG. U.S. PAT. OFF.

MAIN OFFICE: SYRACUSE, N.Y. **FIELD OFFICES:** Albany, Atlanta, Baton Rouge, Birmingham, Boston, Buffalo, Charlotte, Chicago, Cincinnati, Cleveland, Corpus Christi, Dallas, Denver, Detroit, Houston, Indianapolis, Kansas City, Los Angeles, Milwaukee, Minneapolis, New Orleans, New York, Omaha, Philadelphia, Pittsburgh, Portland, Oregon, St. Louis, St. Paul, Salt Lake City, San Francisco, Seattle, Tampa, Tulsa, Washington. **RESIDENT REPRESENTATIVES:** Baltimore, Md., Meriden, Conn., Reading, Pa., Richmond, Va., Springfield, Mass. **FOREIGN AFFILIATES:** Crouse-Hinds Company of Canada, Ltd., Scarborough, Ont., Crouse-Hinds-Domex, S. A. de C. V. Mexico, D. F. **MANUFACTURING LICENSEE:** Peterco, Sao Paulo, Brazil

Circle 527 on postcard, page 33

Snap-on

Industrial Sockets

BUILT EXTRA TOUGH... to take a beating

Just ask a SNAP-ON sales engineer about companies that have cut socket breakage and increased output by switching to SNAP-ON. These built-to-take-it industrial sockets have the extra heft, accurate dimension and special steel toughness to stand up to day-in, day-out production and maintenance work. Result: more work hours per socket — far less downtime due to socket failure.

Wide range to fit your needs!

SNAP-ON sockets are built in a wide range of sizes in ¼-in., ⅜-in., ½-in., ¾-in., 1-in., 1½-in., 2½-in. and 3½-in. square drive. Socket varieties include standard lengths, bolt clearance lengths, thin-wall types, magnetic sockets; special shapes for self-tapping screws and tapered hex nuts; semi-flexockets and full flexockets; plus a full range of extensions and handles.

Talk sockets with your SNAP-ON man. He's a tool specialist who can offer competent advice on what's best for you in SNAP-ON's complete range of industrial sockets. Be sure to specify if sockets are for hand use or for power nut running or for power impact use. SNAP-ON makes different sockets for all these uses.

Service as near as your phone!

SNAP-ON industrial wrenches and mechanic tools are quickly available from stock warehoused at regional industrial and branch sales offices. You get fast action on regular or emergency needs. Write now for new 180-page industrial catalog.

FOR ALL INDUSTRY

SNAP-ON TOOLS

8068-I 28th AVENUE • KENOSHA, WISCONSIN

Circle 528 on postcard, page 33

PLANT ENGINEERS' DIGEST

(Digest begins on page 44)

Hoist used for conveying boxes, packaging materials, operates up to 40 feet, is electrically controlled.

from one level to another solved this problem for Marhoefer Packing Co., at their Muncie, Ind., plant. Buck HoisTower hoisting machines were installed on the outside of their buildings, reducing the traffic inside the building and in elevators.

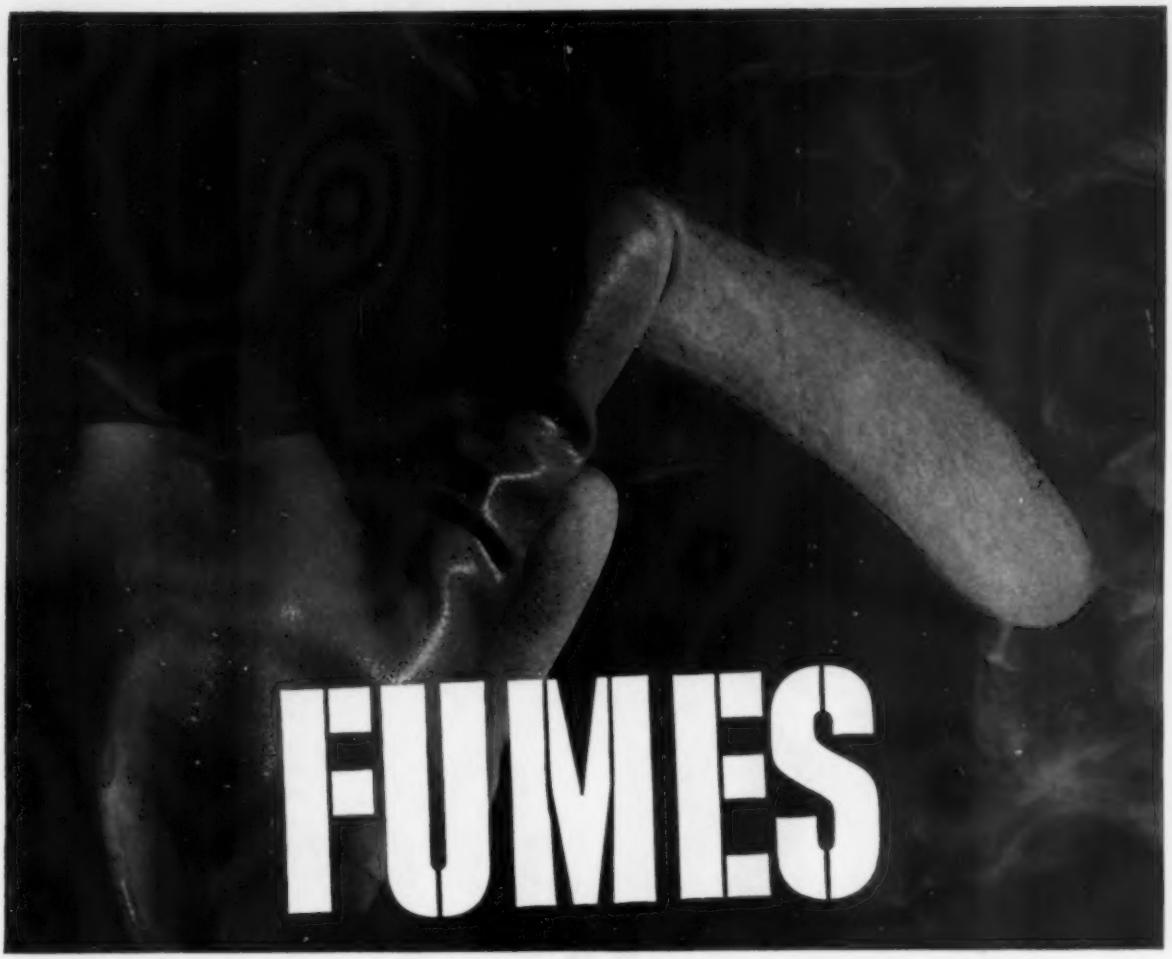
After two years service the hoisting machines have required no maintenance or repairs, have proven safe and reliable and have increased operating efficiency. *From a release of Buck Equipment Co., Cincinnati, Ohio.*

Hoppers Reduce Handling Time

SELF-DUMPING hoppers were used to replace hard-to-handle waste carts thereby reducing handling time by 50 per cent while eliminating maintenance costs and improving safety.

The switch to Roura hoppers was made in the egg safety carton department of the Boxboard and Folding Carton Div. of Continental Can Co., Inc., at their Elkhart, Ind. plant. The hoppers are used to collect trim and waste paperboard from trimmers.

Formerly waste carts were rectangular steel tubs mounted on casters and towed by a fork truck from trimming machines to beater. Towing and dumping of the carts was slow



WHEN THE PROBLEM CALLS FOR PAINT THE BEST ANSWER

IS INVARIABLY **Barreled Sunlight** ENGINEERED Paints

Take a look at the effect process fumes have on painted surfaces in your plant. Unsightly discoloration marks their presence. Next comes corrosion that can tear the hide off the toughest building material and send your maintenance budget "up in smoke".

Before this happens, however, you can take steps to end this costly deterioration. Your first move is to call in a Barreled Sunlight Engineered Paint representative. This man *knows* how paints react to various industrial fumes. He knows which paints best withstand their yellowing and corrosive action. He can also show you — with an "on-the-wall" demonstration — how Barreled Sunlight Paints save on application costs, go on faster and easier with fewer coats.

Give this man an opportunity to help solve *your* specific paint maintenance problem. The coupon below will put him in touch with you promptly and without obligation.

FREE! BARRELED SUNLIGHT PAINT "SLIDE GUIDE"

Contains complete information on Barreled Sunlight Exterior and Interior Finishes, Colors, Primers, and Thinners plus full application and special resistance data.

BARRELED SUNLIGHT PAINT COMPANY
1259 Georgia Avenue, Providence 5, Rhode Island

I want help in selecting the right paint for a specific job in our plant.

☐ Please have your representative call me to arrange an appointment without obligation.

☐ Please send me your new "Slide Guide" to Barreled Sunlight Paints.

Name.....

Title.....

Company.....

Street.....

City.....*Zone*.....*State*.....

Circle 529 on postcard, page 33

This LITTLE trap does a BIG trapping job— and reduces the cost of discharging condensate

NEW NICHOLSON N-150 THERMOSTATIC STEAM TRAP

... All steel construction for rugged durability.

... Design simplified for quick, low cost maintenance.

... Compact, lightweight, easily installed. Can be inspected without breaking pipe connections.

... Equipped with Nicholson steam-saving Baffle*.

For lowest cost-per-pound of condensate handled, this trap is by far your best buy. Like all Nicholson Thermostatic Traps, it opens ONLY when necessary . . . that is, when sufficient condensate collects in trap body to surround the Monel bellows . . . ONLY then does the pressure inside the bellows reduce below line pressure, the resulting differential causing bellows to contract and instantly activate complete discharge. Body is cast steel and cover forged steel. Cover screws, valve and valve seat are hardened stainless steel. Just *one* working part, so maintenance is practically nil. In ½" and ¾" sizes. For pressures from vacuum to 150 psig. Write for details, including the name of the Nicholson man in your area.

**Patent applied for*

W. H. NICHOLSON and COMPANY

12 Oregon Street • Wilkes-Barre, Pa.

Our 80th Year

Circle 530 on postcard, page 33

PLANT ENGINEERS' DIGEST

(Digest begins on page 44)

Hoppers used to collect waste paper from trimmer, dump automatically.

and awkward and often resulted in damaged casters. Upending of the carts required the services of two men.

Hoppers speed round-trip travel time because they are carried faster on the truck's forks and dumped more quickly. They dump themselves then rock back to an upright position, and lock, all automatically. *From a release of Roura Iron Works, Inc., Detroit, Mich.*

Rail-Guided Truck Stacks Films

TO MAKE maximum use of storage area in a film warehouse, Eastman Kodak Co., Rochester, N.Y., uses a rail-guided lift truck.

The 2000-lb capacity Clark lift truck operates on rails to eliminate need for steering. This method in-

Direction of rollers and positioning of attachment is controlled by the operator from rear of truck platform.

Notice how soft the shadows are on the walls? That's typical of light transmission through these domed Consolite fire-retardant skylights. Consolite (registered trademark) is a product of Consolidated General Products, Inc., Houston, Texas.

Safe, glare-free daylighting on a budget

You can't see any "hot spots" under these skylights, can you?

They're made of a reinforced plastic that diffuses the light, banishes glare. Yet they transmit as much as 85% of the light that's available.

These domed plastic skylights are safer, because they can't shatter into a thousand flying fragments. Safer, too, because the plastic won't support combustion—can't feed a fire, ever. They cost less to buy and to install than conventional skylights: they're made in one piece, with integral flashing.

If you're working on plans that call for fire-retardant construction, you'll want to know more about this safer plastic and the many interesting things you can do with it. It's called Hetron.® You can get it made up into glass-reinforced corrugated sheets, flat panes, and striking textured interior panels, as well as skylights. Corrosion-resistant pipes, ducts, and process equipment, too. All are designed to meet stiffest fire codes.

We don't make these structural materials; we just supply the basic plastic, Hetron, that makes them safer. We'll be glad to send you a list of expert fabricators who can supply you. Just write us or check the reader's service card.

HEIL PROCESS EQUIPMENT CO.

Handle corrosive fumes safely in fire-retardant ducts fabricated with Hetron polyester. In plant after plant they outlast other materials, cut replacement and upkeep costs. Hetron ducts above saved **two-thirds** the cost of replacing a previous system damaged by fire; cost less to install; made sprinklers unnecessary.

DUREZ PLASTICS DIVISION

HOOKER CHEMICAL CORPORATION, 3909 WALCK RD., NORTH TONAWANDA, N. Y.

HOOKER CHEMICALS PLASTICS

Circle 531 on postcard, page 33

MODERNIZE–
ECONOMIZE–
STANDARDIZE–

...WITH these electrical systems by

STANDARD
TRADEMARK

TIME CONTROL SYSTEMS

PUBLICATION NO. 250

Centrally controlled, synchronized clocks, time clocks and job time recorders reduce production costs by registering time on a consistent basis throughout entire plant. Yard lights, utilities, signals programmed for automatic operation reduce personal attention required . . . eliminate human error.

FIRE ALARM SYSTEMS

PUBLICATION NO. 251

With automatic "locator" feature that permits instant identification of trouble area . . . confines fire or sprinkler damage by making possible immediate action.

ELECTRICAL TEST EQUIPMENT

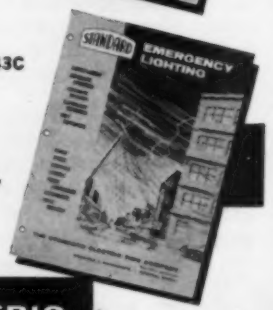
PUBLICATION NO. 247

Voltage distribution panels, test stands, control consoles—custom designed by specialists—for lab or production line test use.

EMERGENCY LIGHTING

PUBLICATION NO. 243C

For protection of personnel, plant and property.
Instantaneous, automatic operation—electrically supervised, 100% dependable, with automatic recovery.



THE STANDARD ELECTRIC TIME COMPANY
89 LOGAN STREET, SPRINGFIELD, MASSACHUSETTS

Circle 532 on postcard, page 33

PLANT ENGINEERS' DIGEST

(Digest begins on page 44)

sures accurate positioning of loads in relation to six-tier storage racks and speeds travel in aisles where a close clearance exists between the end of attachment and the racks.

A side loader attachment is equipped with live rollers powered through roller chains, driven by a hydraulic motor. This attachment can be shifted laterally to feed 600-lb boxes of films into storage boxes on either the right or left side of the aisle. *From a release of Clark Equipment Co., Buchanan, Mich.*

Lubricating With Air

AIR USED successfully as a bearing lubricant is expected to result in wide applications for minimum-friction bearings.

Developed by Boeing Aero-Space Div., this externally pressurized step bearing uses a cushion of compressed air to lift the load-carrying shaft and thus become the bearing lubricant.

The bearing is simpler than normal externally pressurized bearings, where compressed air is injected through tiny orifices in the shaft housing. This new design employs a single, easily drilled opening. Pressurized air entering the shaft housing through this opening becomes trapped in a shallow recess machined on the shaft.

The recess traps only enough air to meet the load requirements. Air flow is throttled as it escapes from the recess, rather than at the inlet, as with orifice types. Step bearings are less expensive to produce, use un-

Inventor C. Adams operates bearing.

TEMPTING EATING starts here at the Keyes Fibre Company factory where attractive paper containers are molded for the food processing industry. Wissco's shaped wire belt gives a flat supporting surface and controls waver... resulting in better quality control of the product.

FAMOUS NAMES
ride on CF&I-WISSCO BELTS
And at Keyes Fibre Company it must be a smooth ride

"We count on 10 to 15 years of life from CF&I-Wissco stainless steel conveyor belts in our machines, perhaps twice what ordinary steel belts can give us," says Mr. Ernest J. Reidman, plant superintendent at the Keyes Fibre Company factory in Waterville, Maine. That's a long period of service but such records of performance are routine for Wissco.

At Keyes—where pulp containers are molded into pie plates, cake circles, meat trays and many other items for the food processing industry—the conveyor belts must offer other features beyond long life. For example, minimum waver on a flat supporting surface is a necessity to prevent distortion of the molded product while it is still soft and wet. Wissco's shaped wire type belt assured the flattest possible supporting surface and a smooth ride all the way. Special engineering design resulted in a waver-controlled belt, making possible the addition of automatic stacking equipment at the discharge end of the dryer. The problem of corrosion was solved by the stainless steel construction of this Wissco belt—and all these advantages were available with reduced belt downtime and thus lower operating costs.

All Wissco Woven Wire Processing Belts are engineered for trouble-free service under the most challenging conditions. Probably, there's one to meet your specific demands. For the complete story on Wissco Belts contact Wickwire Spencer Steel Division, Woven Wire Products Sales Department, P.O. Box 311, Palmer, Mass. 0416

Steel

Your assurance of American-made quality.

The Colorado Fuel and Iron Corporation
Denver • Oakland • New York
Sales Offices in Key Cities

Circle 533 on postcard, page 33

Monile unharmed by multi-ton steel wheel paper trucks since 1957.

MONILE COPOLYMERIZED FLOORS resist spalling and crumbling under heavy trucking ...hard shock...severe vibration...

Monile unaffected by dropping milk cans—lactic acids since 1956.

resist destructive acids, alkalies and salts...

No floor erosion despite severe wear since 1957. Inspectors praise Monile.

resist damage from soaking of oil, grease and water.

Monile gives you time-assured performance...is like new after years of service—under conditions destructive to industrial floors. Monile is applied directly over old or new floors—concrete...wood...brick ...tile. See Sweets Plant Engineering File 5f/MAS or write for 8-page brochure. **The Master Mechanics Co., Cleveland 28, Ohio or The Master Mechanics Chemicals Co., (Canada) Ltd., Toronto 14, Ontario.**

THE MASTER MECHANICS COMPANY

Circle 534 on postcard, page 33

PLANT ENGINEERS' DIGEST

(Digest begins on page 44)

complicated air regulating equipment, and damage less easily than orifice types. *From a release of The Boeing Co., Seattle, Wash.*

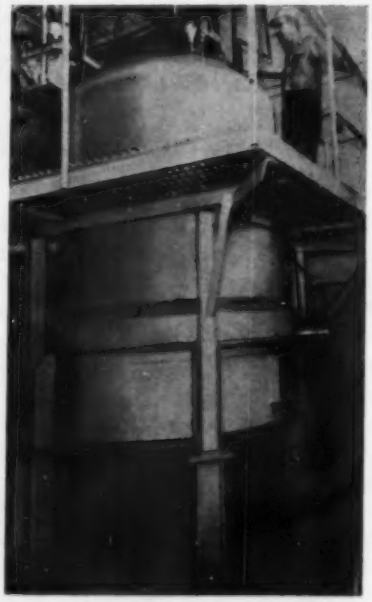
Radiant Heating System Increases Production

INSTALLATION of a completely automatic radiant heat processing system has doubled production of linseed oil to meet increased demands for paints.

In only 18 months the operation economies realized with the new system at Minnesota Paints, Inc., Minneapolis, Minn., over the conventional, open, oil-fired settings have paid back original cost of installation.

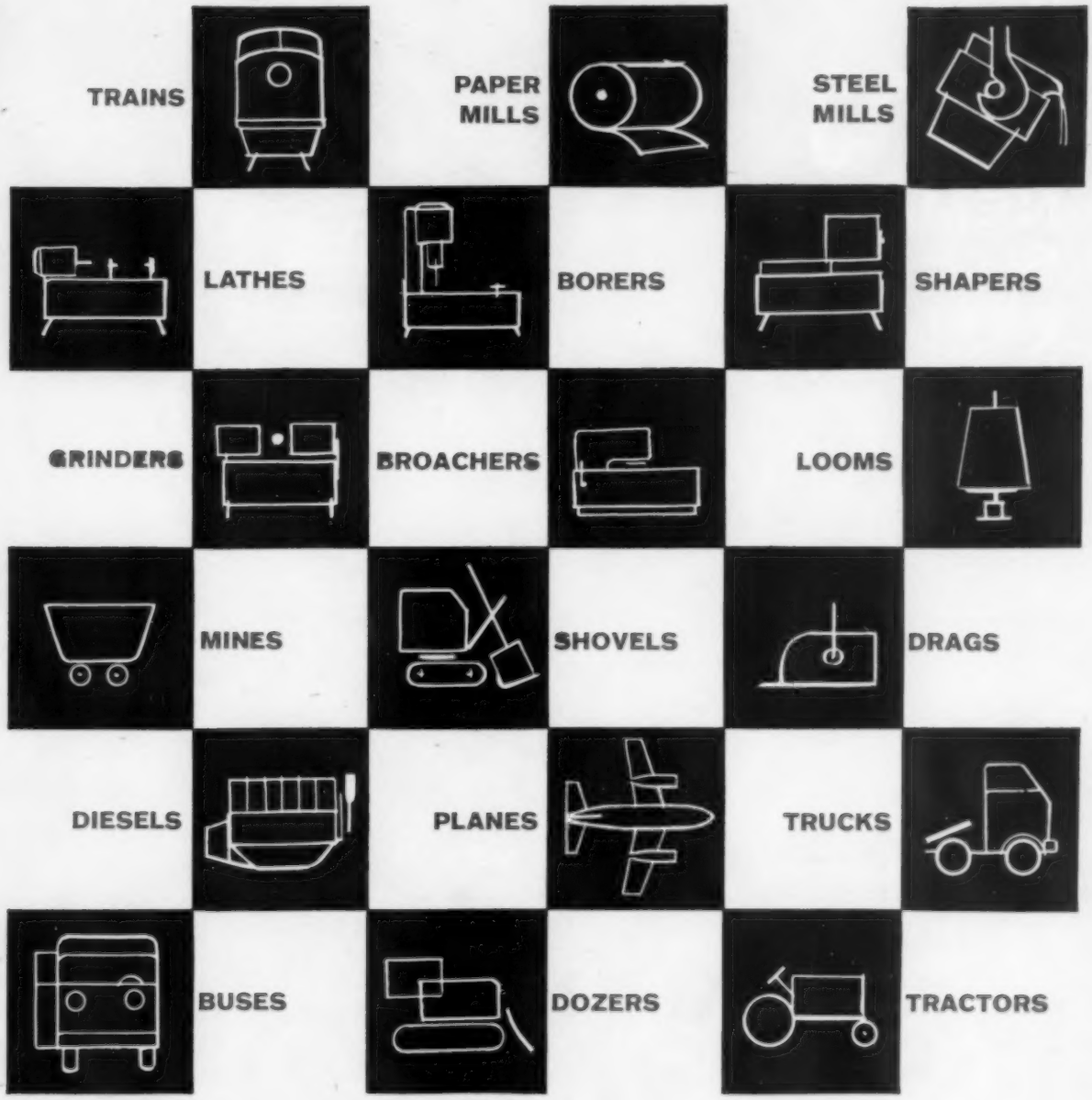
The radiant heating system consists of an enclosed Duradiant burner-setting for a large kettle with two groups of separately-controlled burners; a "packaged" set of automatic operating equipment and controls.

Because of the automatic controls, one man instead of two is all that is needed to supervise cooking operations. Rejects are eliminated due to even heating and proper polymerization of the oil. *From a release of the Selas Corp. of America, Dresher, Pa.*



Large kettle containing linseed oil is suspended into enclosed heating unit, only inches above burner. Automatic control requires little attention.

If you manage or operate any of these...



. . . your best move is to Sinclair's specialized greases, oils and lubricants, to cut costs, speed operations and increase profits. There are more than 500 of these money-savers, and each does its particular job particularly well. For helpful information based on actual experience, call your Sinclair Representative or write

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Technical Service Division
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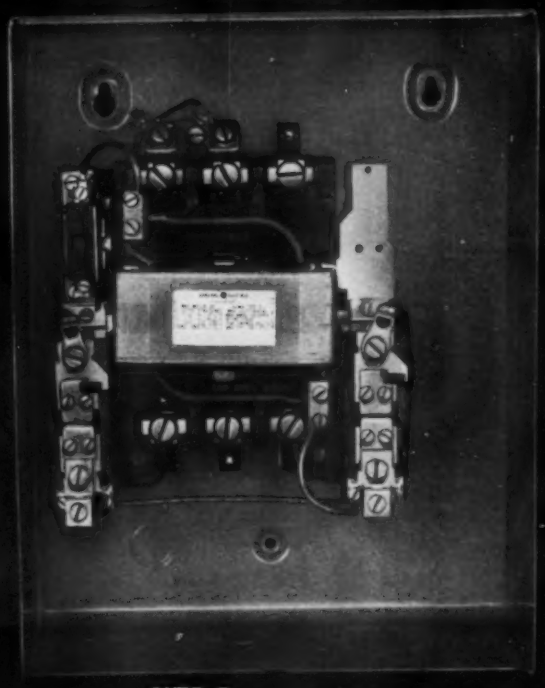
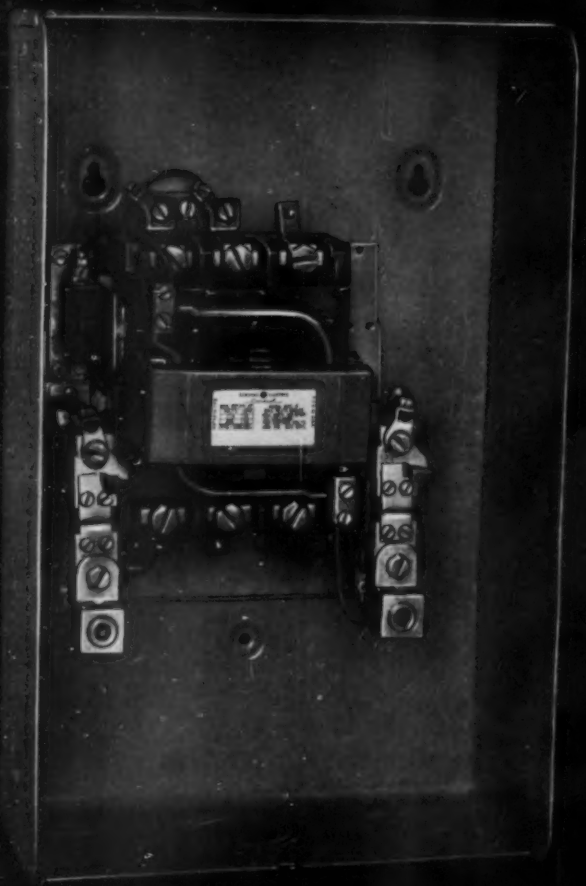
Circle 535 on postcard, page 33

From General Electric . . .

NEW NEMA SIZE 3 NEMA SIZE 4 STARTERS



SIZE 3



SIZE 4

Field-proved 100-Line design—now available in Sizes 00 through 4—offers you unmatched savings in maintenance time and dollars.

Inspect Contacts, Change Coil Without Tools Even on Size 4!

Imagine how much maintenance time and expense you can save with these new General Electric 100-Line starters! Without using even a screwdriver, you can inspect contacts in *10 seconds*, change coil in *20 seconds*. This is convenience no other starter can offer.

These new 100-Line Sizes 3 and 4 starters also give you the benefits of a design *field-proved* on over one million applications:

- Straight-through wiring saves hook-up time. All line terminals are on top, all load terminals on bottom.
- Pressure-type terminals accept wire through size 1/0 on Size 3 and 250 MCM cable on Size 4.
- Durable molded Strongbox coil resists dirt, moisture, oil, and mechanical damage.
- Slanted contacts shrug off dust and other contaminants.
- Wedge-action contacts close at an angle to reduce bounce and resultant arcing and pitting.

New General Electric 100-Line Sizes 3 and 4 starters are now available, enclosed or open, in all popular forms. Call your G-E sales engineer or distributor. Or, write for new publication GEA-7326, to Section 813-36, General Electric Co., Schenectady 5, New York.

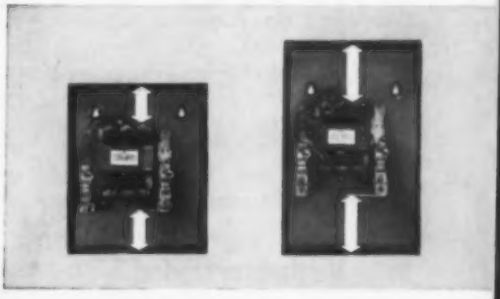
You Get MEASURABLE ADVANTAGES WITH GENERAL ELECTRIC CONTROL

Progress Is Our Most Important Product

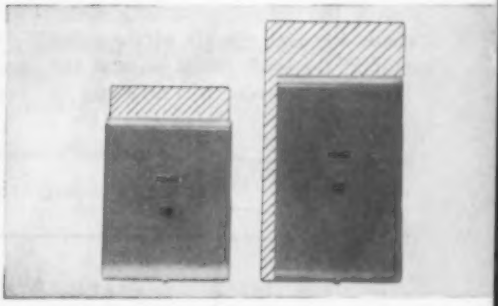
GENERAL ELECTRIC

Inspect all contacts in 10 seconds without tools. Simply lift off spring-loaded retainers on upper right and lower left of coil. Entire movable assembly—including contacts, magnet, and coil—slides out for inspection. Both stationary and movable contacts are visible.

Change coil in only 20 seconds without tools. Lift off the two coil retainers and slide out movable contacts, magnet, and coil assembly. Remove spring-clip in "I" magnet and take off "I" magnet. Molded Strongbox coil can now be lifted off the "E" magnet.



You get plenty of wiring room. Enclosures on these new starters give you 3¼ inches of wiring space at top and bottom on Size 3; 5½ inches top and bottom on Size 4. All line terminals are at top, load terminals at bottom for easy hook-up.



Significantly smaller than previous forms. New enclosed 100-Line starters are 9% to 23% smaller in area, fit where others won't. Size 3 enclosure is only 15⅛ inches high, 12⅛ inches wide, 7⅞ inches deep. Size 4 is 20⅛ x 12⅛ x 7⅞ inches. (Depth dimensions include reset button.) Compare with other makes.

Circle 536 on postcard, page 33

OPERATION AND PRODUCTION®—pointers for the industrial plant engineer

Edited by Ken Lawson

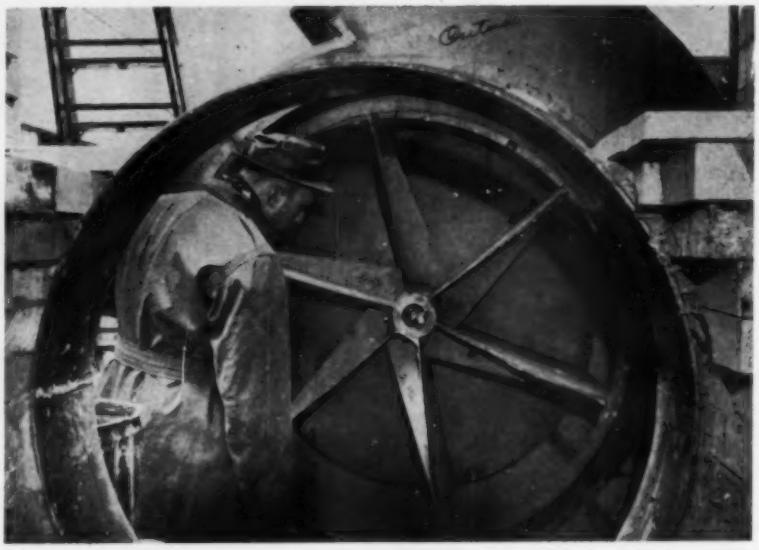
Titanium Fan in Highly-Corrosive Atmosphere Ends Downtime—Pays for Itself in 15 Weeks

ONLY 15 WEEKS after a 49-in. titanium fan went on stream, exhausting wet hydrochloric acid, ferric chloride and cupric chloride gases, it had already paid for itself. It should continue to repay for itself every 15 weeks, because a lifetime of service is expected.

Prior to titanium, carbon steel fans were used. These failed in approximately one week of full operation. Each failure cost $1100 (material—$400, downtime—$600, labor—$100). With the titanium fan and housing priced at $17,000, total costs were thus recovered in 15 weeks of operation.

The rotary furnace, exhaust fan, housing and 120-ft stack are used to salvage polyvinyl-coated copper wire—75,000 to 100,000 lb per day—at the Nassau Smelting and Refining Company Tottenville plant, on Staten Island, New York.

The extremely corrosive exhaust gases are created by the copper wire insulation in the furnace. From the furnace they pass through a salt-water spray unit for cooling and scrubbing. The exhaust contains the residual hydrochloric acid plus the iron and copper salts now thoroughly wet. Should a breakdown occur in this unit, the fan must be able to survive temperatures of more than 700 F, boosting the atmosphere to an even more lethal corrosive level.



View of 49-in., 20,000 cfm titanium exhaust fan from inside rotary wire salvage furnace exit, before installation of the connecting transition piece.

The 20,000 cfm Pfaudler fan weighs only 200 lb and was fabricated of ⅛-in. commercial titanium.

Roller Maintenance Shortcut

By Dick Whitcome, Plant Engineer
Celotex Corp., Fort Dodge, Iowa

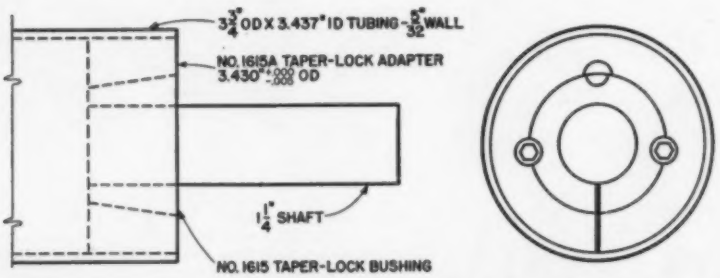
ONE OF THE big problems in a gypsum plant is the maintenance of roller gudgeons. The problem involves the following: The gudgeon comes loose at the ID of the roller tubing; the shaft comes loose at the ID of the gudgeon; it is necessary to have a spare roller on hand for each critical roller in service.

Various methods of welding, pinning and crimping have not been entirely satisfactory for use. The majority of our rollers are 9 ft long and run at 200 rpm with loads of about 25 lb each.

Our solution to this problem makes use of the Dodge Taper-Lock adapters and bushings. The adapters are turned to an OD to give a slight push fit to the ID of the roller tubing. A bushing is then inserted in the adapter and when the two setscrews are tightened an equivalent shrink fit is obtained between the adapter and tubing and between the shaft and bushing.

When it is necessary to replace a roller, we cut the tubing and shaft to length and assemble, using the proper adapters and bushings. This can be done in minutes. All we need in inventory are a few lengths of tubing and shaft stock.

If drive sprockets or sheaves are mounted anywhere on the shaft extension, we use a bushing and do not key it to the shaft.



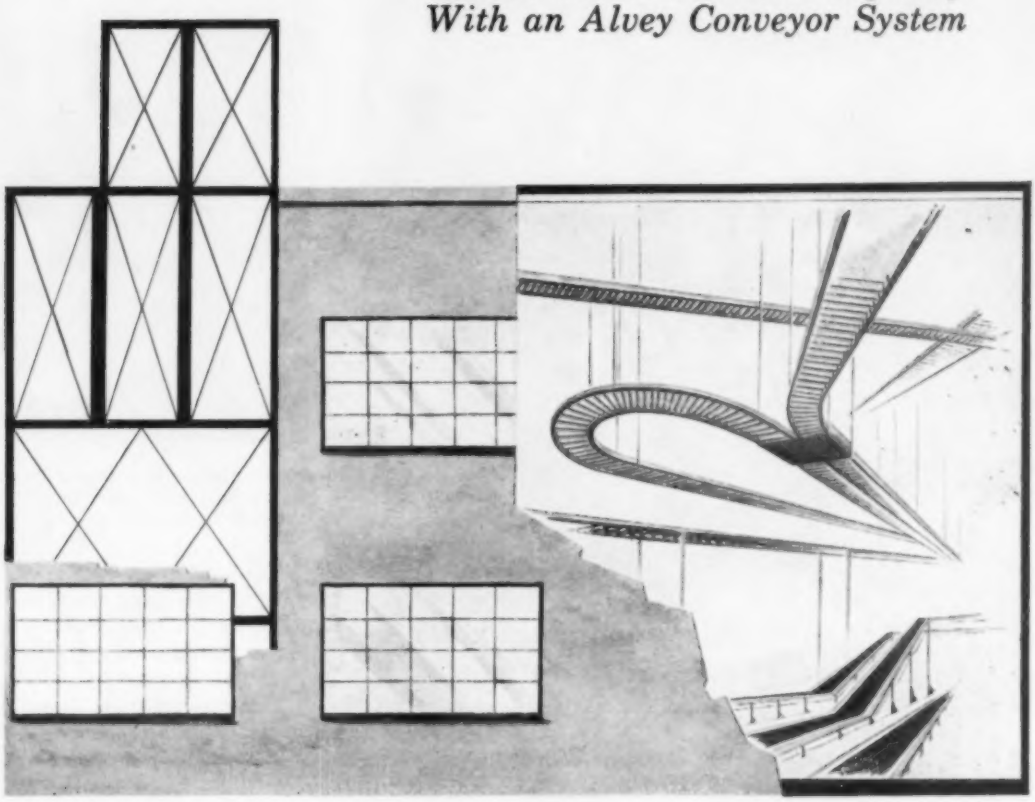
Drawing illustrates the tightening effect obtained between the shaft and tubing with the bushing and adapter for a 3¾-in. conveyor roller gudgeon.

Space-Saving Battery Charger

SILICON-DIODE chargers are mounted above the floor on a steel frame in battery room at the new mechanical

START YOUR OWN BUSINESS BOOM

Reduce Costs—Increase Capacity
With an Alvey Conveyor System



NEW CONSTRUCTION

When you're *positive* you must build a bigger plant, to get more capacity, call in Alvey's experienced material handling engineers at the planning stage. When the decision is to add on, use their ingenuity to get all the capacity you build for.

MODERNIZATION

Often you don't need a bigger plant at all. Alvey engineers have helped increase production as much as 30% in *existing* plant area, with a minimum of new equipment. Before you expand, have Alvey analyze your present system. It costs you nothing to consult.

Write for free copy of case history telling how Alvey revamped an existing system *and* engineered a new one, for the same company, with considerable success.

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Successful material handling is Automatic with Alvey for:

A. E. Staley Mfg. Co. · Armour & Co. · The Hoover Co. · Firestone · A.C.F.Wrigley · Whitehall Laboratories · Royal McBee Corp. · Phillip Morris · Goodrich-Gulf Chemicals · Hiram Walker · Anheuser-Busch · Esso Standard Oil

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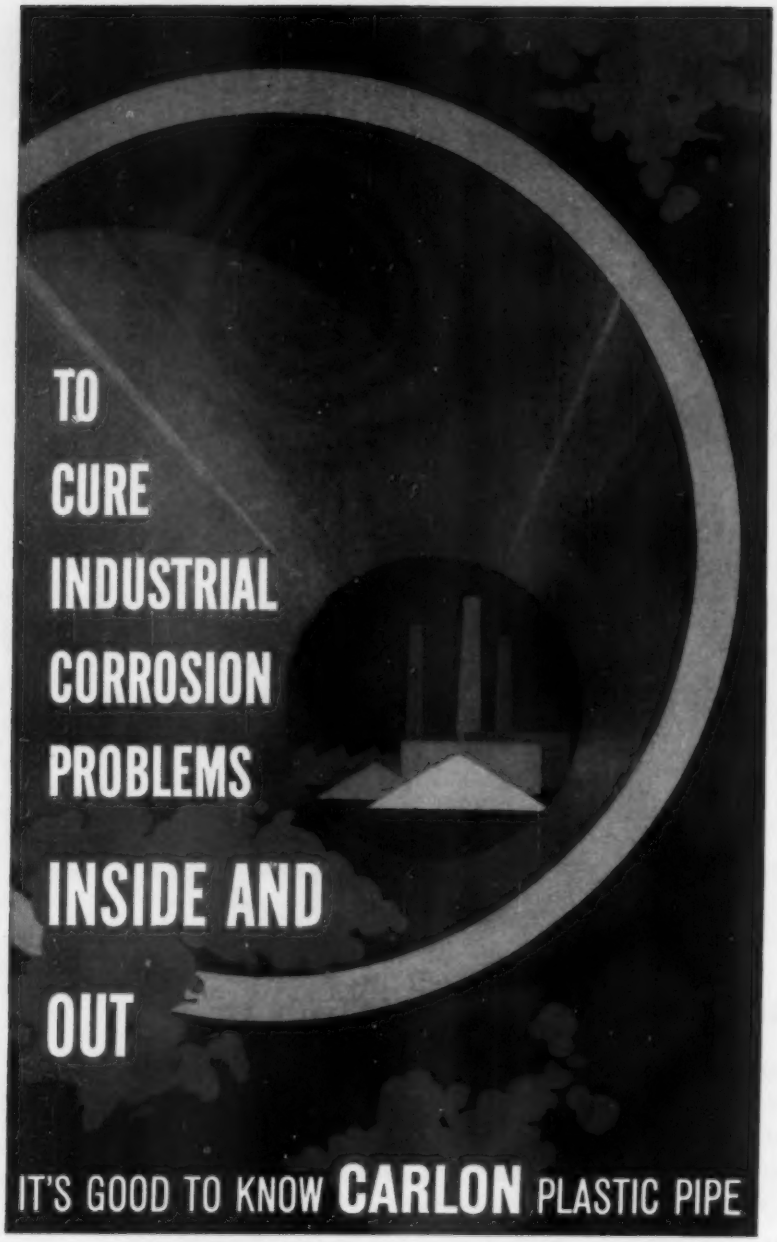

Carlon's new Plastic Pipe Fact-pak can save your company money. Includes chemical resistance tables, operating temperatures and pressures. *Write for yours.*

KNOW THE FIRST NAME IN PLASTIC PIPE
CARLON

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Box 133 — Aurora, Ohio — *Dept. PE-5*

Please send me the new Plastic Pipe Fact-pak.

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Circle 538 on postcard, page 33

OPERATION—PRODUCTION

(O and P begins on page 56)

This installation photo shows space-saving battery charger mounted with controls at the convenient eye level.

plant of *The New York Times*. The forks of each hand truck roll under Exide rectifier chargers, saving space, and a steel baseboard prevents truck forks from damaging wall.

Eighteen batteries, in or out of trucks, can be charged simultaneously in a 16-ft by 30-ft room at this new $20-million section of a building planned as the eventual home of the entire operation.

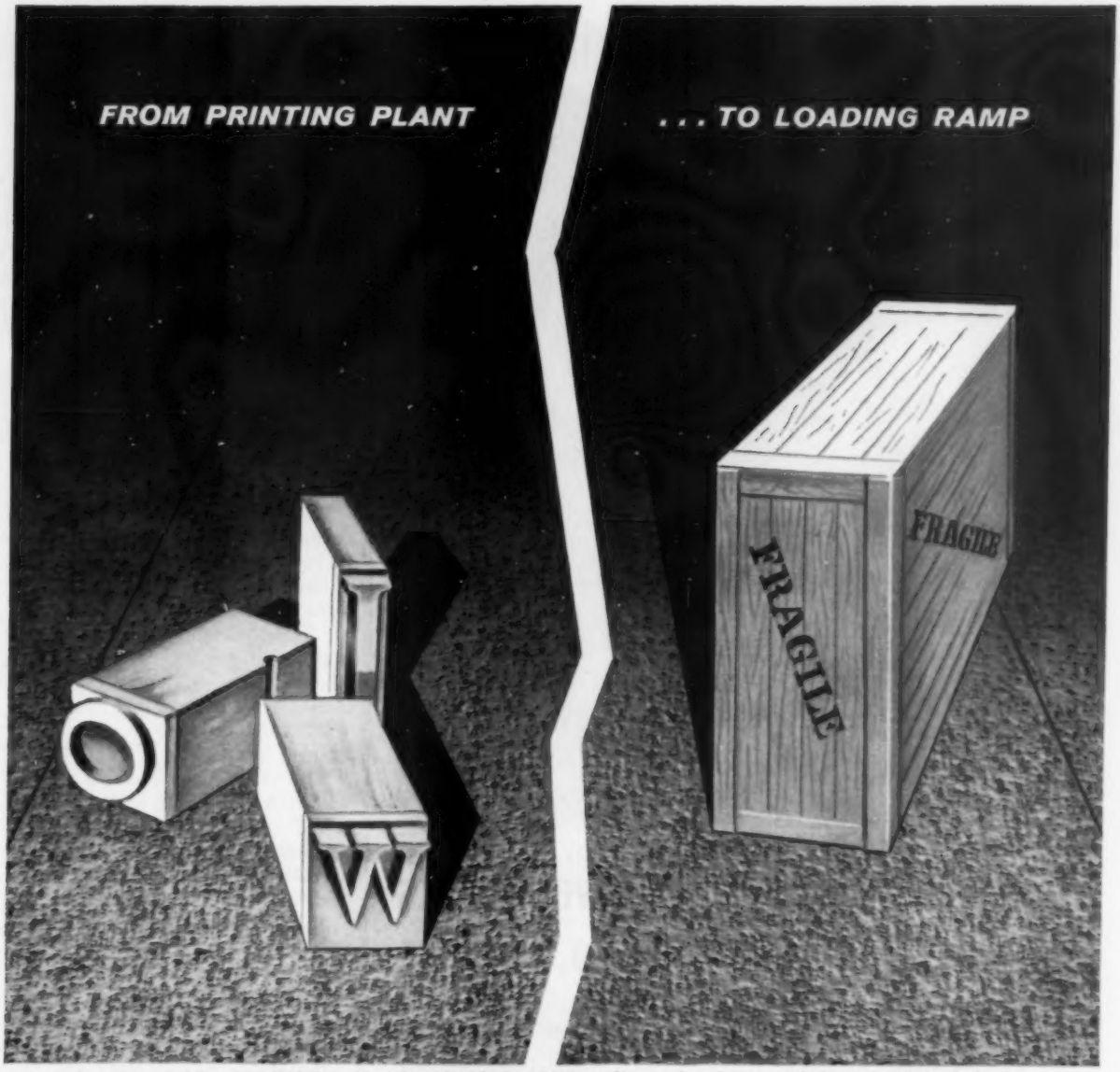
Lubricant Variety Reduced 56 Per Cent

A REDUCTION in the number of lubricants required for machinery used in the manufacture of steam generating equipment in the Paris, Texas, works of The Babcock & Wilcox Company has resulted in lower inventory costs, better utilization of maintenance manpower, and less chance of lubrication errors.

The benefits have been achieved as a result of a Gulf lubrication survey which reduced the plant's inventory from 16 lubricants to seven grades of four basic lubricants.

The basic approach to a lubrication survey for these machines was to consider them according to function and operating conditions. Individual components of the machines—drive gears, ways, bearings, etc.—were then grouped according to similarity of lubrication requirements.

Thus, one highly stable lubricating



Abrasive particles are rolled densely and uniformly into high-quality steel and act as friction grips for safe footing.

There's never a slip on A.W. ALGRIP

(the only ABRASIVE rolled steel floor plate)

Step up your plant safety with Algrip—the world's only abrasive rolled steel floor plate. It provides safer footing where splashing water, grease, oil, ink mist or other slippery substances might otherwise pose serious plant hazards. Even on steeply inclined surfaces, Algrip creates firm traction for workmen's shoes and the wheels of rolling stock.

This high quality steel plate is light enough to use as flooring overlay and is strong enough for independent flooring. Fabrication is simple. You can shear, form, weld and drill it with standard shop equipment. Fire and chemical resistant, Algrip flooring is approved for safety by Underwriters' Laboratories. Write today for Bulletin AL-S4.

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Conshohocken, Pa. • STEEL PRODUCERS WITH THE CUSTOMER IN MIND

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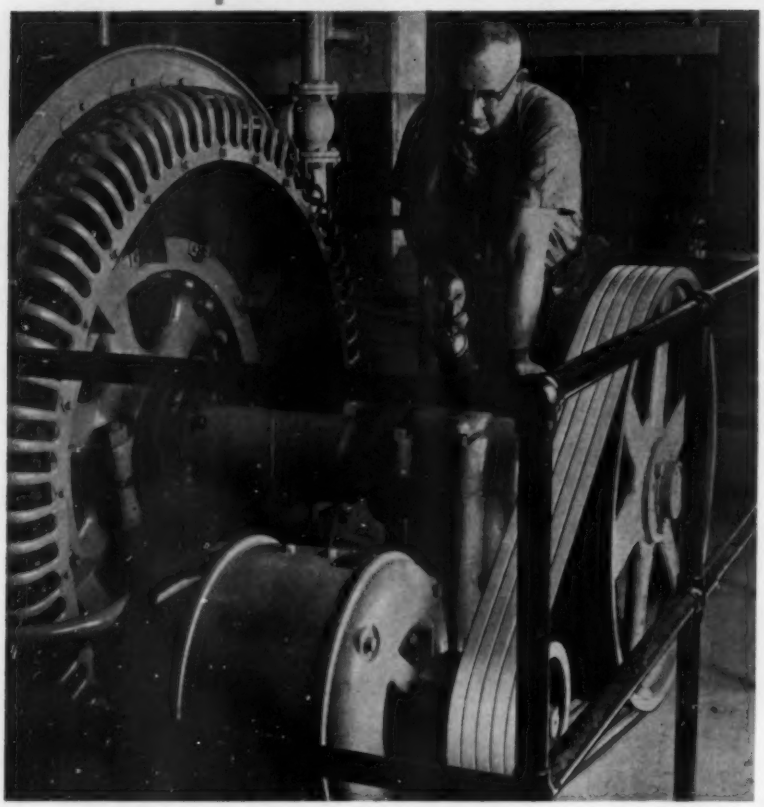
Circle 539 on postcard, page 33

Need replacement V-Belts?



Reliability of Gates Hi-Power V-Belts makes them industry's No. 1 choice

The exclusive construction features of Gates Hi-Power V-Belts—the Concave Sides (U.S. Patent No. 1813698), the Arched Top, the Flex-Bonded Tensile Member—make them more dependable than ordinary, conventional V-belts. They give you long belt life on even the toughest applications.

Moreover, because of Gates high standards of quality control, you get a perfectly matched set of Hi-Power V-Belts every time—every belt pulls its share of the load throughout the service life of the drive, further increasing belt life.

You will get fast delivery of Hi-Power V-Belts from the local stock of your nearby Gates Distributor. Call him today.

The Gates Rubber Company
Denver, Colorado
BP 60

Gates Hi-Power V-Belts

Circle 540 on postcard, page 33

OPERATION—PRODUCTION

(O and P begins on page 56)

oil—though in two different viscosities—was recommended for the hydraulic systems of a butt welder and press.

For applications where shock loads and high pressures are factors to be contended with, lubricants with non-foaming, non-corrosive and extremely stable characteristics with high film strength were selected.

Typical applications for these lubricants include speed reducers on bending and welding machines, on planer ways, swager slides, ways and enclosed gears, and in the gear cases of overhead cranes.

With these essential oil-lubricated components on major equipment taken care of, it remained to specify a lubricant suitable for open drive gears. In the few places where these are found—notably the engine lathe, planer, and overhead cranes—a lubricant which has resistance to effects of moisture, acid fumes and gases, and withstands extreme temperature changes was chosen.

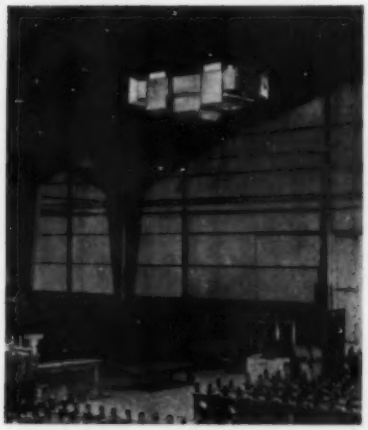
The fourth major recommendation was for a grease with properties that would satisfy all grease-lubrication requirements in the plant. The grease specified was a general purpose ball and roller bearing lubricant.

Supplementing the benefits obtained through this lubrication survey was the decision to assign one man the task of lubricating all machinery and equipment. Says Master Mechanic C. C. Eagon: "With a simplified lubricant inventory and one man responsible for oiling all equipment, we avoid errors of both omission and commission. As new machines come in we call in lubrication engineers. They help us translate the manufacturer's lubrication recommendation in terms of their oils and greases."

Heating Problem Solved

A HEATING PROBLEM posed by high ceilings in Central Transformer Corporation's Arcadia, Florida plant was solved by use of gas-fired downflow heaters.

This facility consists of three connecting corrugated aluminum buildings with a total of 65,000 sq ft of floor space. The ceilings were 30 ft high at their peak and for flexibility



This unit heater is hung 25 ft above floor level but can maintain an effective distribution up to 40 ft height.

of plant layout, it was desirable to maintain maximum overhead clearance in the manufacturing and traffic areas.

As a solution the company specified Reznor down-draft heaters, which are designed especially for high-ceiling installation. The units are also used for air circulation in the summer months. Three 600,000 Btu heaters were installed 25 ft above floor level in each of three bays. They heat the plant during cold spells experienced about three months of the year. Propane gas is used as fuel because of the lack of a natural gas supply in the area.

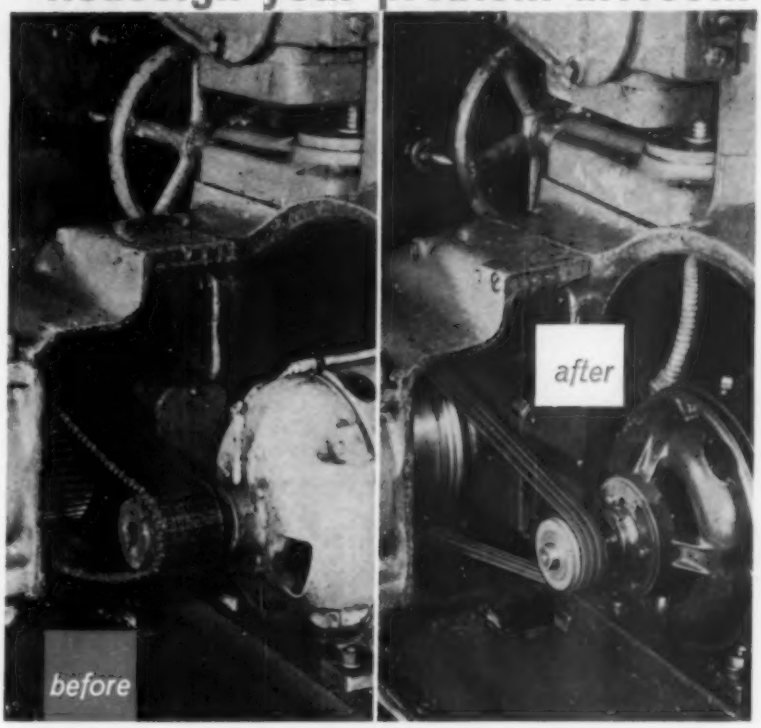
Cuts Flash and Burr Rejects

DAILY parts production per worker was boosted from 8 to 300 units, and rejection rate cut from 5 per cent to less than 1 per cent by means of a supersonic stream of gas-propelled abrasive particles. Thus a serious bottleneck in production of a tiny gyro component by Electronic Mechanics, Inc., Clifton, New Jersey, has been eliminated.

Airbrasive, a product of S. S. White Industrial Division, is a unique industrial tool for cutting or abrading hard, brittle material. For example, it will cut shapes out of a tungsten sheet only 0.005 in. thick and will cut intricate patterns and shapes in silicon semiconductor wafers.

The machine can be operated manually or on an automated production line. The same tool can cut a line as fine as 0.008 in. or abrade an area as large as several square inches. It is compact and portable, easily shifted from location to location. It uses five

Redesign your problem drives...



How Gates Super HC Drives are reducing drive down-time

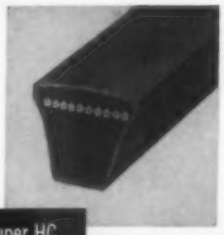
If you have a chain, gear, flat belt or conventional V-belt drive that is causing costly production down-time or high maintenance costs, a Gates Super HC High Capacity V-Belt Drive can be your answer.

Because of exclusive changes in V-belt shape, construction and materials, a Gates Super HC Drive can handle the same power as a conventional V-belt drive in ⅔ to ½ the space—with fewer belts and smaller, lighter-weight sheaves. As a result, bearing loads are less, giving increased bearing life. Also, it is often possible to eliminate outboard bearings and jack shafts, reducing the number of elements present to cause drive down-time.

Moreover, Gates Super HC Drives absorb machine-damaging vibration and shock. Multiple belts assure you of continuous operation, further cutting costly machine down-time.

The Gates Man near you is a drive design expert. Ask your nearby Gates Distributor for his help when you have a drive problem.

The Gates Rubber Company
Denver, Colorado



Exclusive design features include: precisely engineered Arched Top, Concave Sidewalls, Flex-Weave cover, super strength tensile construction.

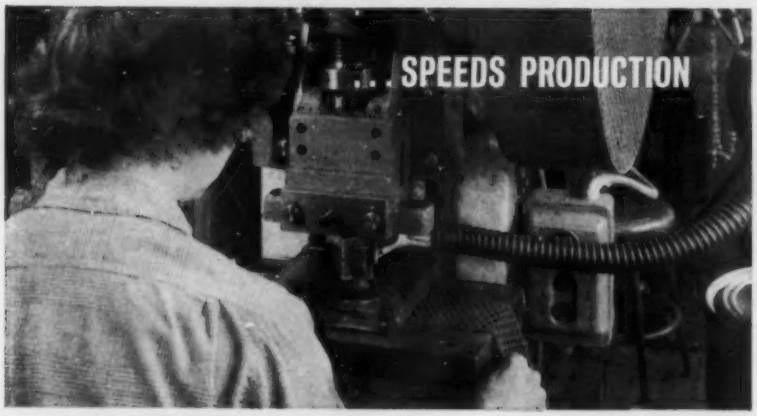
Gates

Building the future on 50 years of progress

Gates Super HC V-Belt Drives

Circle 541 on postcard, page 33

Here, DOUBLE DUTY Use of a SPENCER VACUUM SYSTEM



At Charles W. House & Sons, Inc., Unionville, Connecticut, a single Spencer vacuum system contributes to plant efficiency and operating economy in two important ways, by:

SPEEDING PRODUCTION—At the machines where washers are stamped from felt strip, vacuum picks up the washers, conveys them to containers and carries off the fuzz and dust—leaving washers **clean.**

SIMPLIFYING MAINTENANCE—Cleaning is quick and thorough with Spencer vacuum. And because dirt and litter is carried off through an enclosed piping system, there's no hazardous, unhealthful recirculation of dust or lint.

For a no-obligation analysis and suggestions on how Spencer vacuum may be able to meet **your** production, conveying or maintenance needs, write outlining your particular problems.

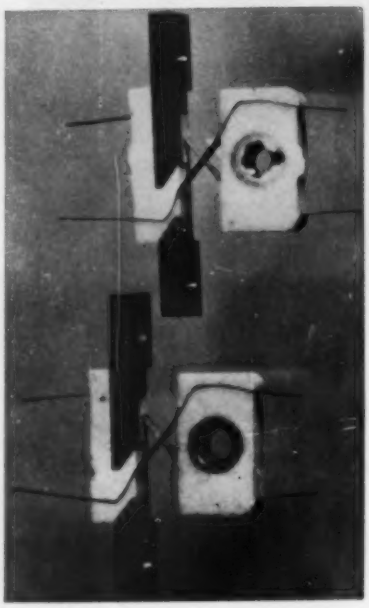
Request Catalogs No. 155B "Spencer Vacuum", and No. 143-B "Pneumatic Conveying".

The SPENCER TURBINE COMPANY
HARTFORD 6, CONNECTICUT

Circle 542 on postcard, page 33

OPERATION—PRODUCTION

(O and P begins on page 56)



Glass-bonded mica components in magnified before (top) and after views showing cleaning action of the supersonic abrading or cutting tool.

types of powder to meet a wide range of needs, from 27 micron to 10 micron aluminum oxide, also calcium magnesium carbonate for fine cleaning and etching.

By using a sodium bicarbonate powder it reportedly will complete the necessary potentiometer wire-stripping six to ten times faster than previous methods, and with improved accuracy.

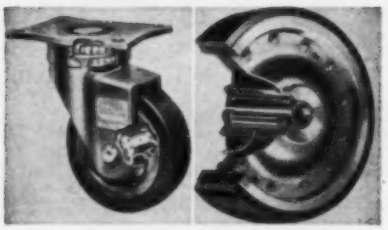
Positioner Expedites Press Feed

THE PROBLEM at Artistic Veneers, Inc., Chicago was to find a way to keep layers of fine expensive veneer wood in close register position as it was made into sandwiches and handled prior to being placed in the steam-heated hydraulic forming press.

With selection and use of an automatic power positioner this problem was solved. Now when a load of three sandwiches of veneer wood has been assembled on a layup table an operator button energizes this positioner. This causes the air powered hydraulic cylinder to push a layup table in line with the first opening in the hydraulic steam press. The positioner is made by Hanna Engineering

THIS NEW FREE HANDBOOK GIVES THE FACTS about

DARNELL
CASTERS & WHEELS



TYPES AND SIZES
to meet all needs of industry

Featuring Darnelloprene treads - a soft, resilient Neoprene rubber compound that has superior qualities in resistance to oils, waxes, most chemicals and oxidation - these casters offer ease of movement, quietness and protection for floors.

Look in the YELLOW PAGES

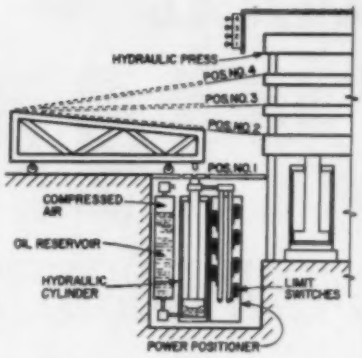
Call your nearest DARNELL DISTRIBUTOR

DARNELL CORPORATION, LTD.
DOWNEY (Los Angeles County) CALIF.
37-28 SIXTY-FIRST, WOODSIDE 77, L.I., N.Y.
36 NORTH CLINTON ST., CHICAGO 6, ILL.
1000 PEACHTREE N. E., ATLANTA, GA.

Circle 543 on postcard, page 33

Works, Chicago, Illinois.

This procedure is repeated in rapid fashion to fill the press before the glue sets. The automatic positioner



Positioning action of this electro-mechanical four station automatic lift is visualized in schematic above.

speeds up this routine by lifting the layup table in line with the press openings. The operator just pushes the predetermined position button he wants, then turns to slide the sandwich into the press. No operator time is lost getting the layup table lined up.

Compressed air at 100 psi from the plant's system is the energy source. It is applied to the top of hydraulic oil in the reservoir to operate the power cylinder.

Calipering Device Speeds Work

An ingenious calipering device enables Marshall Studios, Veedersburg, Ind., to speed up turning of round lamp parts and table legs on this Rockwell-Delta wood lathe. It consists of a series of sheet metal fingers, mounted on a bracket behind the lathe, which is set for the maximum diameters. The fingers rest on the stock until the wood is turned to the set diameters; they drop off when proper diameter has been reached.

USE THE COUPON BELOW FOR MORE INFORMATION ON NEW ECONOMICAL

PYROGARD C
FIRE-RESISTANT FLUID

See ad on following pages

Mobil

Mobil Oil Company, Room 2058H
A Division of Socony Mobil Oil Co., Inc.
150 East 42nd Street, New York 17, N.Y.

Gentlemen: I am interested in learning how new PYROGARD C fire-resistant fluid can aid my operation.

NAME _____
POSITION _____
COMPANY _____
ADDRESS _____
CITY _____
ZONE STATE _____

Circle 544 on postcard, page 33

FOR IMPROVED PLANT SAFETY PLUS

NEW, ECONOMICAL

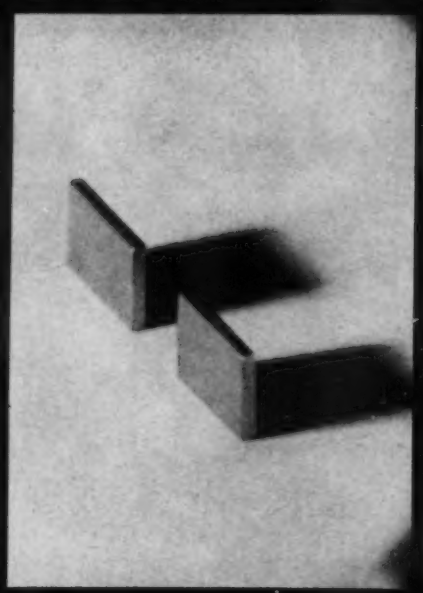
PYROGARD C

FIRE-RESISTANT FLUID

Mobil

HERE'S HOW PYROGARD C CAN HELP YOU!

Ignition resistance increases mill safety—PYROGARD C helps you protect your property and personnel against fire. Ignition resistance is demonstrated here. Hydraulic oil (left) bursts into flame immediately and PYROGARD C (right) resists combustion when poured onto steel plate heated to 1000F.



Good anti-wear properties assure long pump life—PYROGARD C fire-resistant fluid is designed for most pumps and pressures encountered in mill hydraulic equipment . . . gives excellent protection against pump wear for fluids of this type. Pump vane at left is new. Vane at right has 1000 hours of service with PYROGARD C at 160F and 1000 PSI. Wear is almost undetectable.

Compatibility with seals, metals eases fluid installation—PYROGARD C fire-resistant fluid is easily installed because it has no adverse effect on most packings, seals, or hoses, and is non-corrosive to metals normally found in mill hydraulic systems. Containing effective rust inhibitors, PYROGARD C fire-resistant fluid gives excellent protection against rusting wherever it contacts metal.

POSITIVE HYDRAULIC RESPONSE...

Now, the makers of world-famous Mobil petroleum hydraulic oils bring you PYROGARD C, a new fire-resistant fluid that offers positive hydraulic response plus improved plant safety . . . at low cost.

PYROGARD C fire-resistant fluid is a water-in-oil emulsion containing special chemical addition agents. It's been thoroughly field tested in actual service . . . will give excellent performance under conditions such as those encountered in press welders, furnace-door openers, ladle-tilting mechanisms, scrap balers, and die-casting machines.

The major benefits provided by PYROGARD C fire-resistant fluid are detailed below. In addition you receive the help of experienced Mobil Engineers in applying it to your equipment. Their specialized know-how in the installation and maintenance of fire-resistant fluids will make the procedure sure and simple. Examine the benefits of PYROGARD C fire-resistant fluid —then contact your nearest Mobil Representative.

Long-term stability in storage and use assures uninterrupted production—PYROGARD C fire-resistant fluid is highly stable even at higher-than-normal temperatures—resists breakdown, foaming and water separation—keeps pump parts and screens free of deposits. And with PYROGARD C, water evaporation is retarded by a thin oil skin that forms when the emulsion is at rest, yet readily remixes when fluid is agitated (shown above).

Unusual flow properties assure positive hydraulic response, yet reduce leakage—PYROGARD C fire-resistant fluid has unusual viscosity characteristics . . . resists leakage at static joints, yet gives rapid flow and response elsewhere in the system. In apparatus above, a specially designed "leak chamber," introduced into hydraulic system, shows the PYROGARD C leaks less than ordinary hydraulic oil.

MOBIL OIL COMPANY, 150 East 42nd Street, New York 17, N. Y.

PROTECTOR OF YOUR PROFITS!

Dust is a destroyer. It corrodes. It abrades. It ups down-time. That's why you need protection from this menace. Pangborn Dust Control Equipment provides you with this protection.

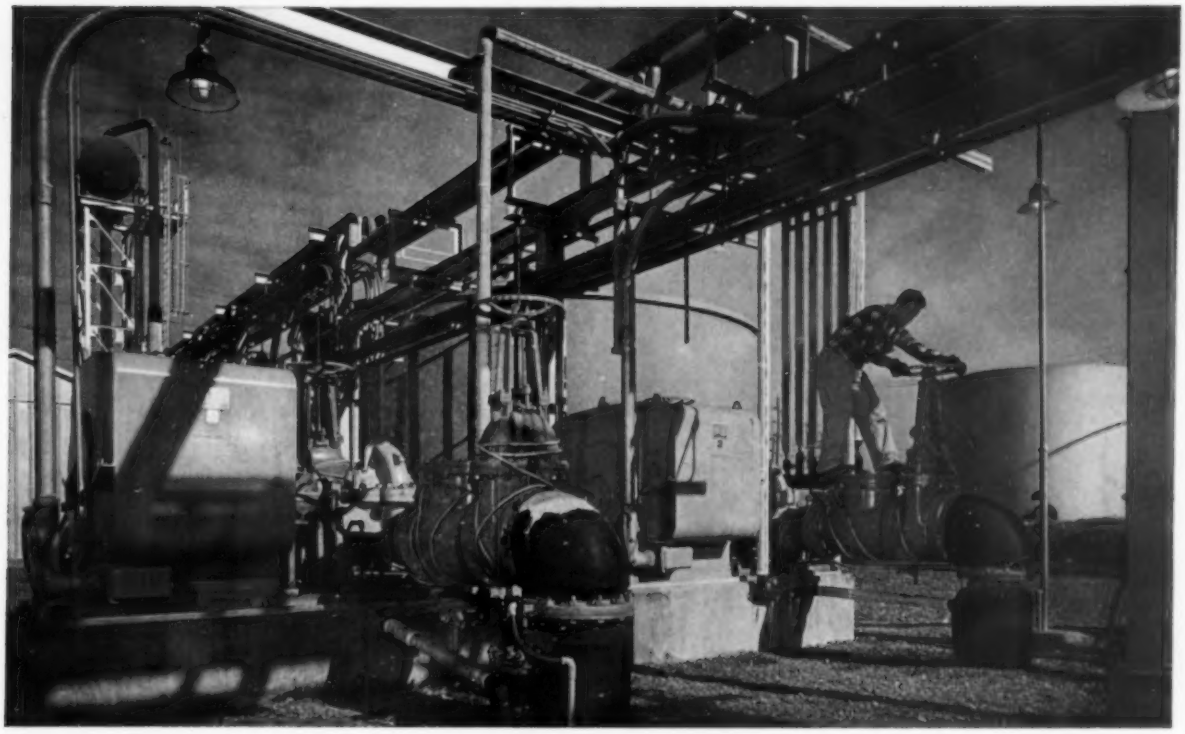
Eliminating costly dust damage is just one of the many money-saving functions of Pangborn Dust Control Equipment. It also improves plant housekeeping. It protects men as well as equipment. It salvages usable dust. And it can improve your relations with your community.

Pangborn has the right dust collector to fit every requirement. Cloth Bag, Tube, Screen, Self-Cleaning and Unit Type Dry Collectors, also Wet Collectors in all sizes. For more facts, write:

Pangborn Corporation, 3200 Pangborn Blvd., Hagerstown, Md.; Pangborn Canada,Ltd., 47 Shaft Rd., Toronto (Rexdale), Canada —Manufacturers of Dust Control, Blast Cleaning, Vibratory Finishing Equipment; Rotoblast® Steel Shot and Grit©.

Pangborn
OF HAGERSTOWN

Circle 546 on postcard, page 33



For Corrosion Protection In Depth . . . *Call The* TRUSCON MAN!

Wherever plant and equipment are subject to critical acid, alkali or solvent exposures, high humidity, severe weathering, fumes and gases – or any combination of these–your first step should be to call the Truscon man.

Truscon will provide you with guidance in proper surface preparation, coating application, and inspection. Truscon will also present you with a detailed, written specification on protection of steel, iron, aluminum, concrete and other surfaces–interior and exterior.

Truscon, with a background of over fifty years in successful corrosion control, makes its services available to plant management, engineers and contractors for purposes of plant survey and specification of protective coating systems.

For a detailed description of the principal Truscon protective systems, and how they serve you, mail the coupon below for your copy of Truscon Corrosion Control Bulletin 9111. And, take advantage of a corrosion control specialist's services. Call the Truscon man!

FREE!

Truscon Corrosion Control Bulletin 9111 . . . yours without obligation. Mail coupon now.

TRUSCON Laboratories

DIVISION OF DEVOE & RAYNOLDS COMPANY, INC.

TRUSCON LABORATORIES,
1740 Caniff, Detroit 11, Michigan

☐ Send Truscon bulletin 9111 ☐ Send the Truscon man

Name _____ Title _____

Firm _____

Address _____

City _____ Zone _____ State _____

Circle 547 on postcard, page 33

Two C135/135H Fuller Rotary Compressors at the Herbrand Division of the Bingham-Herbrand Corp., Fremont, Ohio, leading manufacturer of forged mechanics' hand tools and steel forgings for the automotive industry. Each compressor is rated 680 cfm, atmosphere to 100/110 psig., at 690 RPM.

Here's the 4-Year Maintenance Bill on Fuller Rotary Compressor at Herbrand Division of Bingham-Herbrand Corp.

So satisfactory was the performance of its first Fuller Rotary Compressor, installed in 1956, that Herbrand Division installed another like it 3½ years later.

When the older unit was inspected after four years operation, no replacement of parts was necessary. After installation of a new gasket (cost $9.35)—to replace the one that had to be removed to make inspection—the compressor continues to add to its service record.

The newer compressor has also been entirely trouble-free, and Herbrand plans a third, when increased air capacity is required. It, too, will be a Fuller—for, as Herbrand says, "These compressors can be classified as maintenance-free."

Because Fuller Rotary Compressors are practically vibration-free, they can be installed without complicated or expensive foundations or structural modifications. They are simple and efficient, with no valves to leak, no seats to grind. Blades automatically compensate for wear. They have forced-feed lubrication to all parts within the cylinder. Rotor, bearings and blades are the only moving parts.

Fuller Compressors range from 30 to 3300 cfm, pressures to 125-lb. gauge.

Write for Bulletin C-5A. It tells the whole story.

See Chemical Engineering Catalog for further details and specifications.

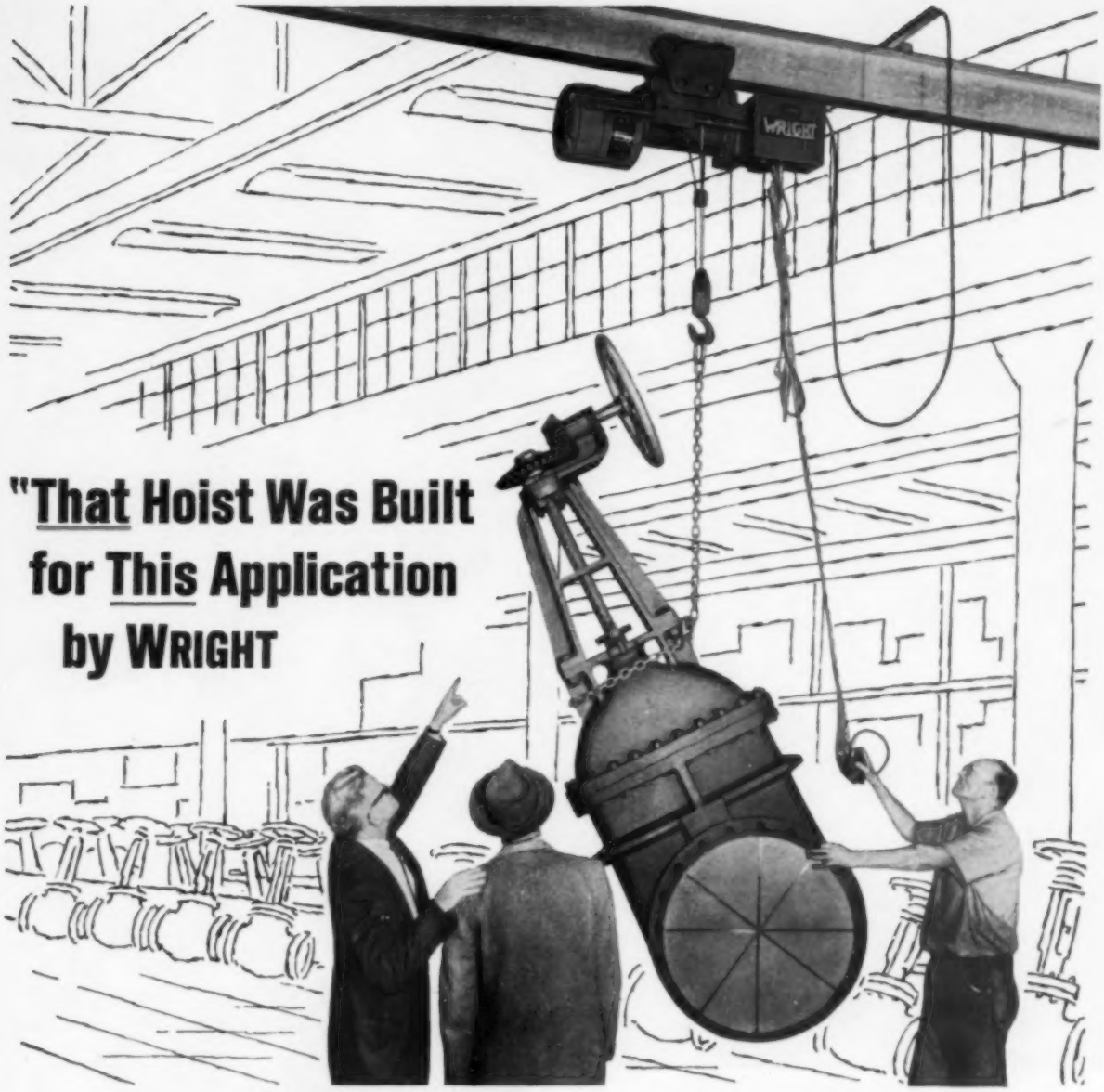
FULLER COMPANY GENERAL AMERICAN TRADE MARK

FULLER COMPANY
138 Bridge St., Catasauqua, Pa.
Subsidiary of General American Transportation Corporation
Offices in Principal Cities Throughout the World

Fuller
....pioneers in harnessing AIR

2852
C-364

Circle 548 on postcard, page 33



"That Hoist Was Built for This Application by WRIGHT

"This new W-1 Electric Hoist can be built to your exact job requirements. You can get it in capacities from 1 to 3 tons. For close headroom, ask for WH-1, in capacities 1 to 2 tons.

"Wright's overload cut-off can be had on both models. It gives you 3-way protection of operator, load and hoist. Our hoists are factory tested at 50% above rated capacity before overload cut-off is installed.

"These are the hoists to buy for handling efficiency, low maintenance cost, long service life."

STRONG W-1 SPEEDWAY FEATURES

- **MOTORS**—Fully enclosed, ball bearing type. Built to NEMA specifications and rated on basis of 30-minute duty cycle.
- **BEARINGS**—Anti-friction, precision ball or roller bearings support both ends of all shafts. They are mounted in splash oil lubricated gear chamber.
- **MOTOR BRAKE**—External expanding jaw, self-adjusting cam type; operated by solenoid.
- **DRUM**—Fabricated all-steel construction with liberal drum to cable diameter ratio to reduce wear and cable fatigue.

See your WRIGHT distributor for complete information about the W-1 or write us at York, Pa.

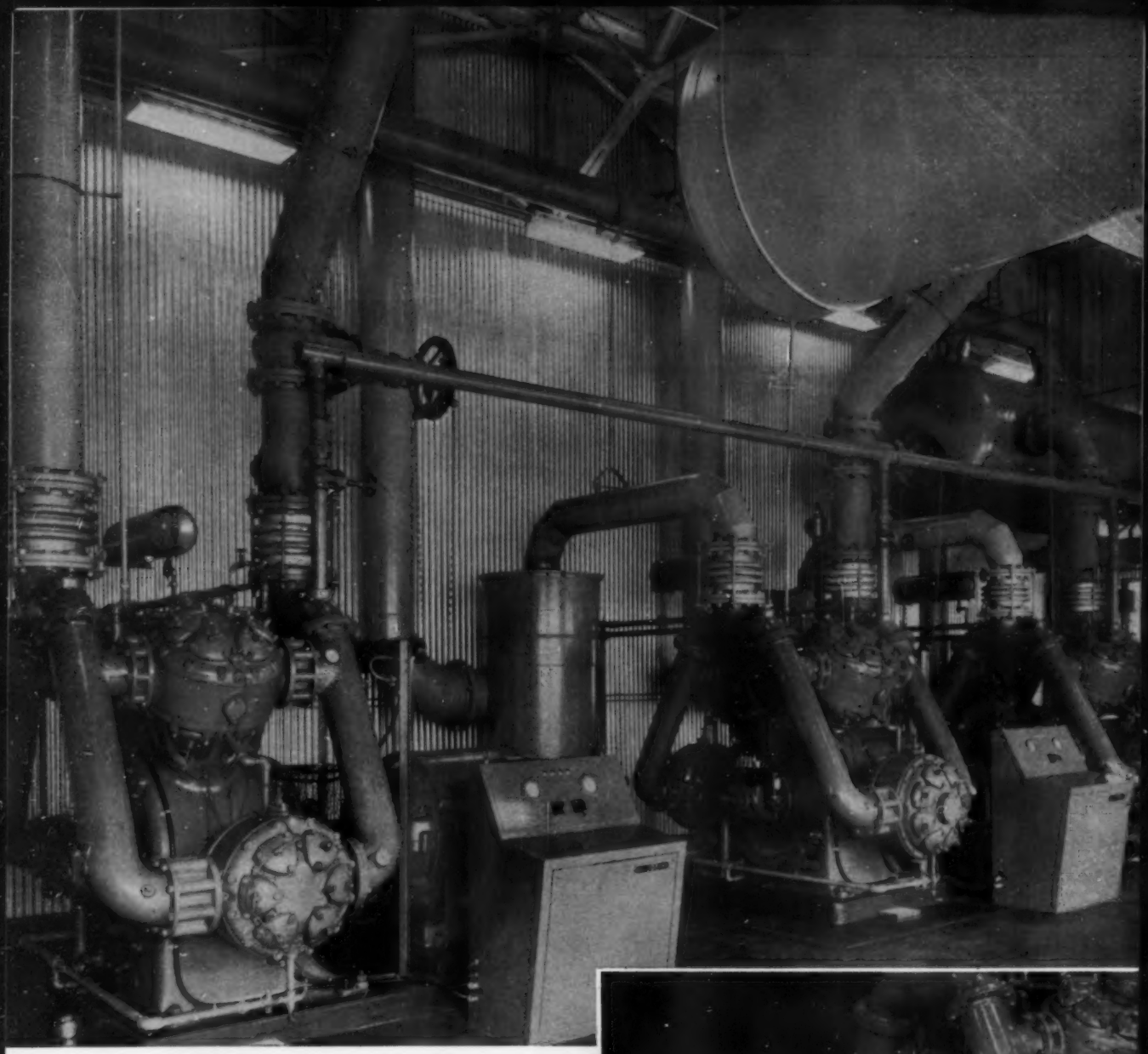
WRIGHT HOISTS

Wright Hoist Division · American Chain & Cable Company, Inc.

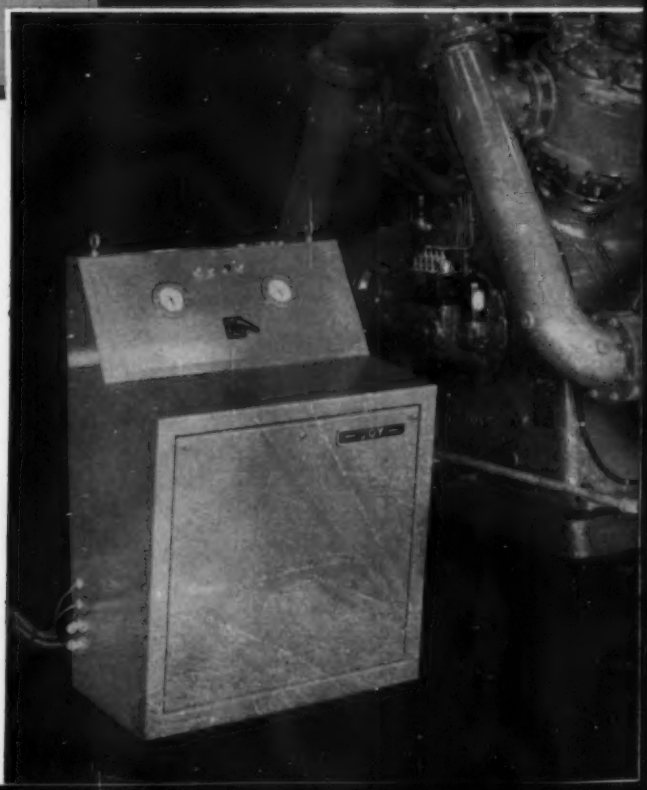
York, Pa., Atlanta, Chicago (Melrose Park), Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

ACCO

Circle 549 on postcard, page 33



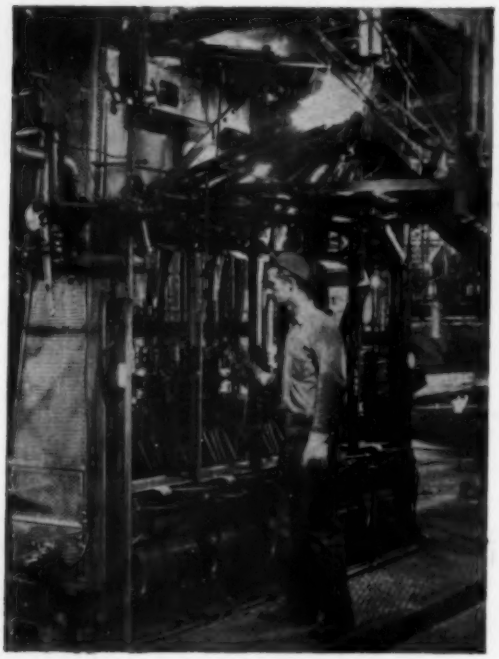
Four Joy WM-114 Compressors supply 4200 cfm of 50 pound air and 5000 cfm of 35 pound air to perform a variety of functions in the Liberty Glass Company's container plant at Sapulpa, Okla.



Completely automatic operation and automatic shutdown protection against malfunctions was provided when this modern compressor room was engineered. Air costs have been cut substantially, and costly shutdowns of the continuous batch glass making process have been completely avoided.

JOY'S completely automatic protection–operation for compressors cuts air cost at Liberty Glass Company

Cost of process air at the big Liberty Glass Company plant at Sapulpa, Okla., has been greatly reduced with the installation of a battery of four Joy WM-114 Compressors. Complete automatic shutdown protection against malfunctions, plus completely automatic operation enables Liberty to run the compressors unattended three shifts per day, seven days per week. Routine maintenance is performed by the plant engineering staff on the daylight shift. Liberty has realized a savings of 15-20% on the direct cost of maintenance since installing the Joy machines, and has completely avoided costly shutdowns of the continuous process.



Automatic shutdown protection is provided against lubrication failure, high discharge air pressure, high cooling water temperature and low cooling water pressure. In addition, the motor-generator set, water circulating pump and cooling fan on the air-cooled heat exchanger for jacket cooling water are electrically interlocked and will shut off in the event of an electrical failure anywhere in the system.

All four compressors have five-step control. Two are set for 50 pound air, the other two for 35 pound. In each pair, either machine can be automatically set to carry the base load, and all cylinders on each machine can be individually set to run unloaded when demand is low. The two 50 pound machines can also be cut into the 35 pound header through a throttle valve to meet very high demand for 35 pound air. This gives Liberty complete flexibility in meeting the air demand.

For complete information on how Joy compressors can cut your air costs, consult your Joy representative, or write for Bulletin 3186-15.

The big, modern Liberty plant turns out 3300 gross of plain and decorated returnable glass milk, beverage and general line containers per day. Founded in 1912, it is one of the oldest and biggest container companies west of the Mississippi.

AIR MOVING EQUIPMENT FOR ALL INDUSTRY

JOY

Joy Manufacturing Company
Oliver Building, Pittsburgh 22, Pa.

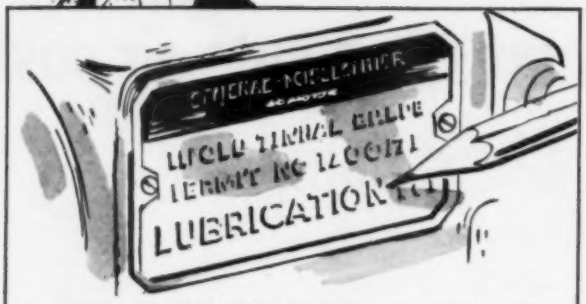
In Canada: Joy Manufacturing Company (Canada) Limited, Galt, Ontario

Circle 550 on postcard, page 33

DISTRIBUTOR DAN, the SKF bearing man, offers

FIVE TIPS ON BEARING LUBRICATION

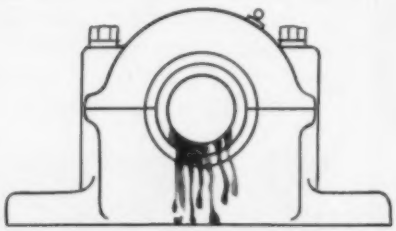
—that can save time and trouble for you



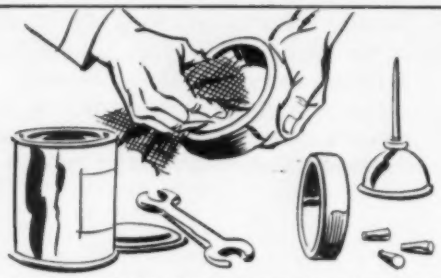
WHEN TO RE-LUBRICATE? Always follow the manufacturer's directions, if they're available. Most bearings, whether oil- or grease-lubricated, need cleaning and re-lubrication once a year. Re-lubricate oftener if the bearing is large, operates at high speeds or temperatures of 120-140 F. or higher.

WHAT GREASE CAN TELL YOU. Grease itself can tell you when cleaning and re-lubrication are needed. Dark grease means that oxidation has started or that abraded particles are present. Changes in the original color indicate water. Grease of a hard consistency should always be replaced.

WHEN TO CHANGE OIL. Compare the oil in the bearing with unused oil. Clouded oil indicates water. Dark oil frequently indicates sediment. Dark, pitch-like coatings on the rings, roller ends or cage mean the oil has become dirty or begun to carbonize. So, clean the bearing and housing and re-lubricate.

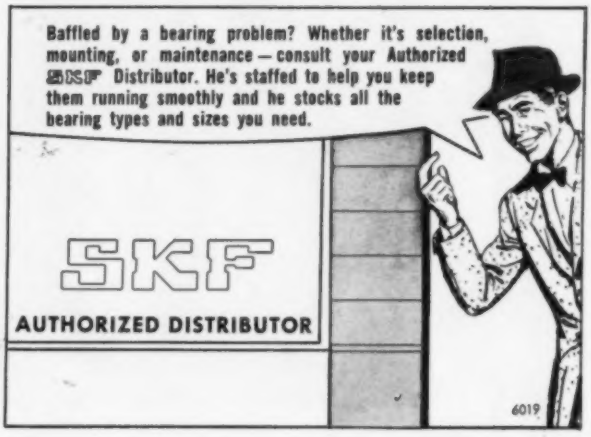


TOO MUCH IS WORSE THAN TOO LITTLE. Don't overlubricate. Only grease that actually contacts the bearing lubricates. Using too much grease may cause churning and lead to overheating and loss of lubricant. Remember: the higher the speed, the more sensitive a bearing becomes to excessive lubrication.



CLEANLINESS, FIRST AND LAST. Clean new oils and greases will usually force-out old lubricants in the bearings. But they won't if the lubricant is badly oxidized. Pour a hot aqueous emulsion into the housing. Rotate shaft until bearing is clean. Drain solution while rotating shaft. Then, flush with hot light oil, drain and add new lubricant.

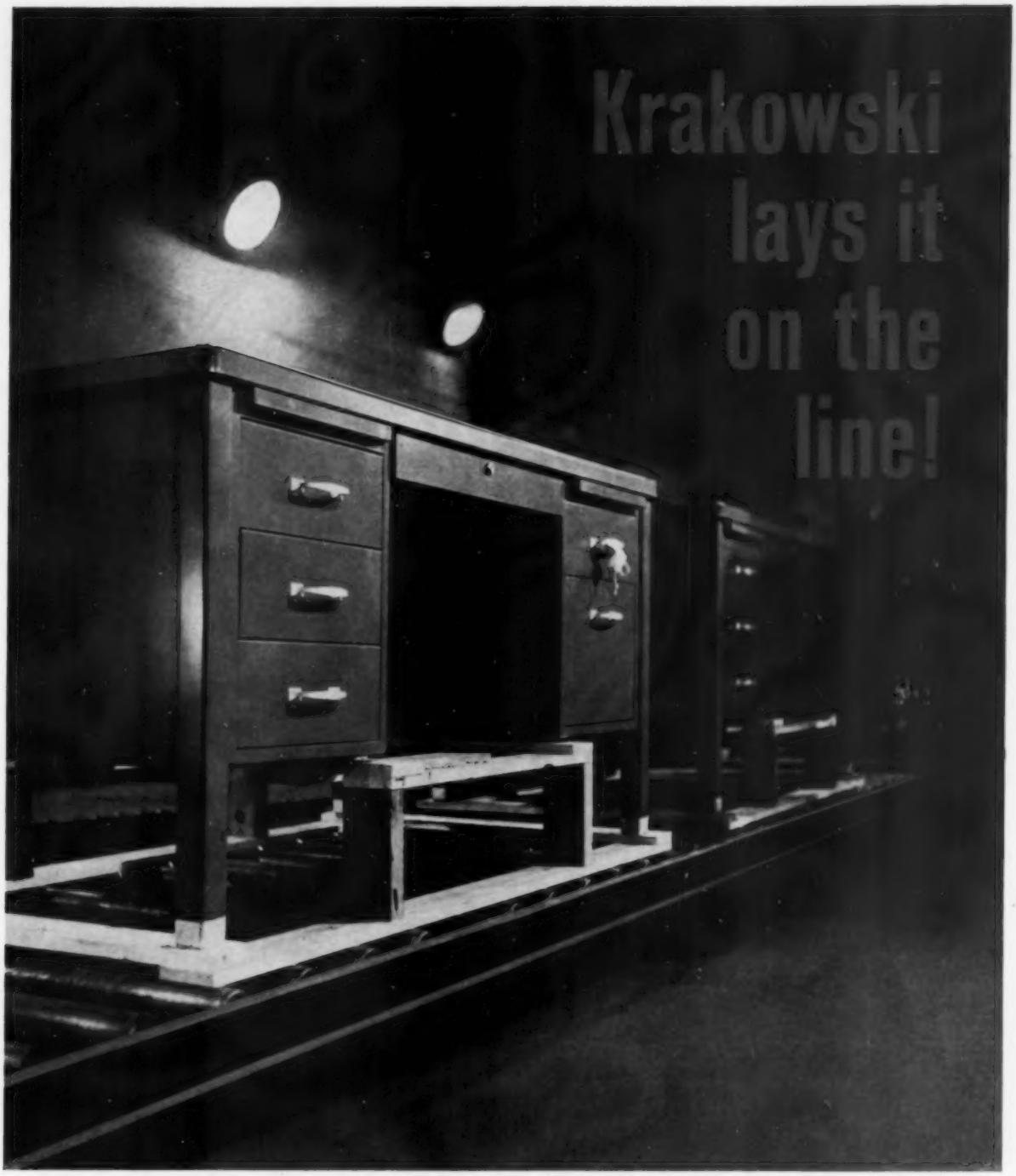
Baffled by a bearing problem? Whether it's selection, mounting, or maintenance — consult your Authorized SKF Distributor. He's staffed to help you keep them running smoothly and he stocks all the bearing types and sizes you need.



SKF MOTION ENGINEERING

Advanced ball and roller bearing technology

Circle 551 on postcard, page 33



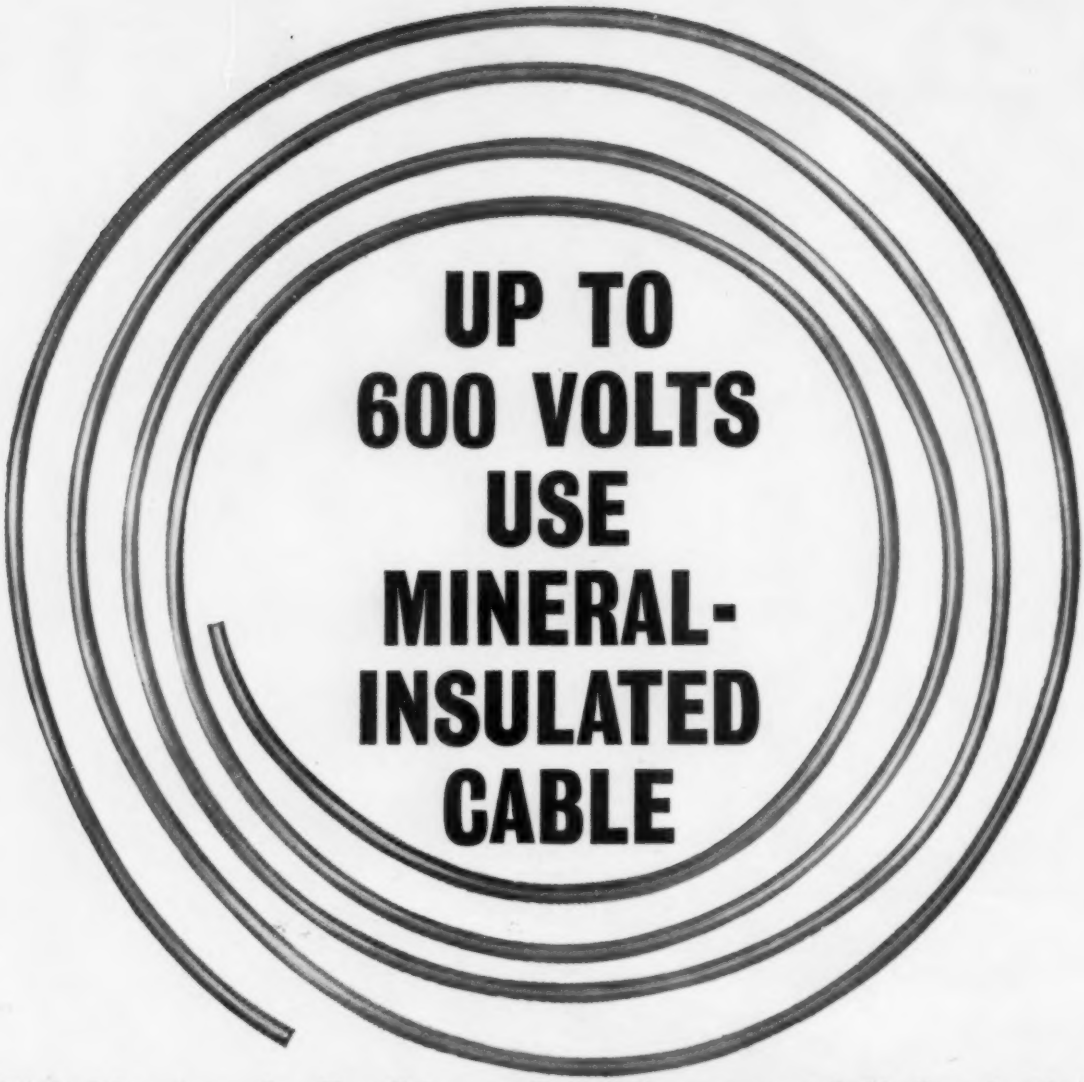
Lou Krakowski, General Superintendent of the Harrison Sheet Steel Company, is a guy who makes no bones about what he wants. It's service! And, for twenty years, he has been getting what he considers the best . . . Cities Service.

Turning out, among many other things, 125 steel desks a day, he wants complete and dependable lubrication service. One of the many Cities Service products he uses to get this job done is Trojan H-2 grease. For general greasing on all equipment, multi-purpose Trojan H grease has a wide range of application. And, because of the variety of jobs Trojan H grease does, it reduces his necessary lubrication stocks.

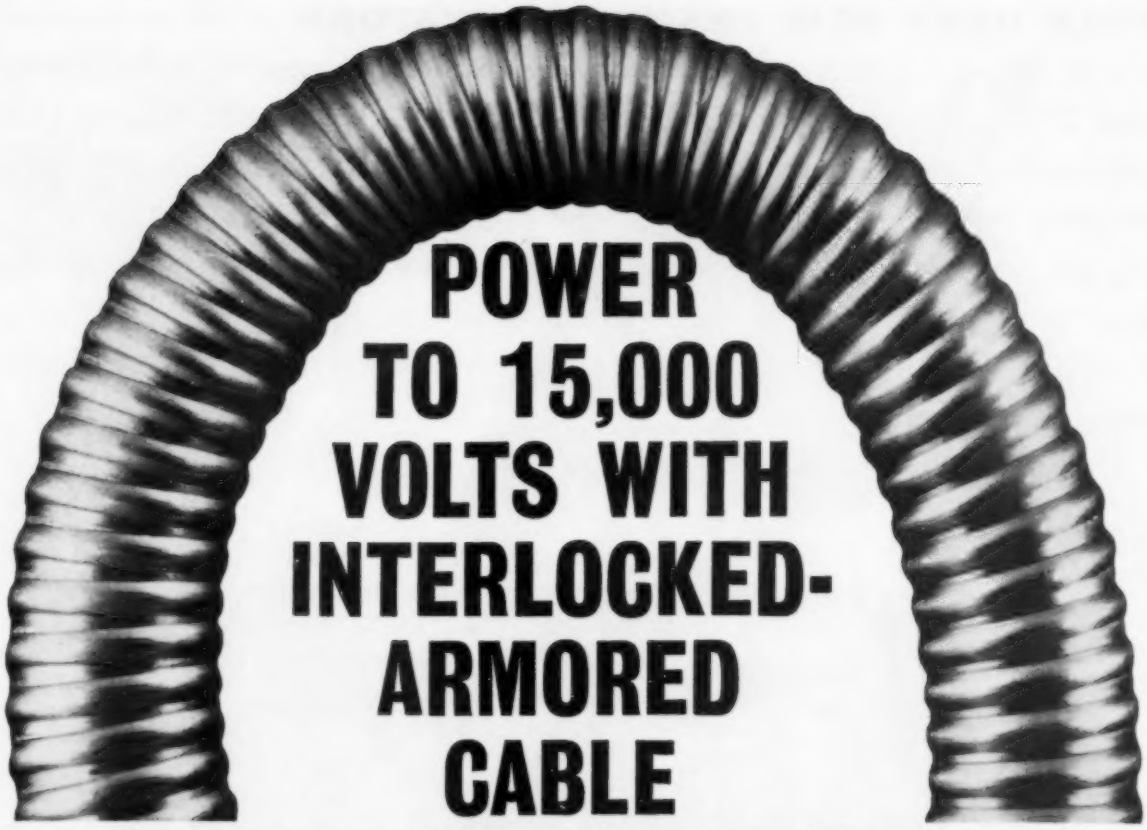
If you have to *get it on the line* . . . call your nearest Cities Service office . . . or write Cities Service Oil Company, 60 Wall Street, New York 5, N. Y.

CITIES SERVICE
QUALITY PETROLEUM PRODUCTS

Circle 552 on postcard, page 33



MI Cable, too, is flexible and needs no conduit for installation. MI's conductors are insulated with refactory mineral insulation, and protected by a seamless gas tight, liquid tight copper sheath. There's no danger from moisture, vapor, or heat with MI! ■ An MI Cable job goes in fast, yet meets the highest possible standards of safety and long life. For up-to-600-volt jobs, you can't beat MI Cable.



POWER TO 15,000 VOLTS WITH INTERLOCKED-ARMORED CABLE

Protect your power cable with Interlocked-Armor, indoors or out... for any above ground installation. Interlocked-Armored Cable is flexible and the contractor installs it without conduit or pullboxes. For service up to 15,000 volts—specify General Cable Interlocked-Armored Cable.

■ Be sure you get quality, economy and flexibility in your cable installations. Have your electrician or contractor specify Interlocked-Armored and MI Cable by General Cable Corporation, 730 Third Avenue, New York 17, N.Y.

GCC
GENERAL CABLE CORPORATION

Circle 553 on postcard, page 33

Otis

WORLD'S
WORD FOR
ELEVATOR
QUALITY

DOLE USES OTIS FREIGHT ELEVATORS in its production line to move canned pineapple to storage after processing. They transport 275-million cans a year. Since 1953, DOLE has protected this vital production capacity with dependable OTIS elevator maintenance. Is elevator maintenance complex? Yes! It is an organization task requiring an unusual combination of skills. Plus a wide knowledge of parts, assemblies, functions, replacement procedures, testing and adjusting. Plus the availability of original replacement parts. Plus immediate service in emergencies.

OTIS ELEVATOR COMPANY • 260 ELEVENTH AVENUE • NEW YORK 1, N.Y.
OFFICES IN 297 CITIES ACROSS THE UNITED STATES AND CANADA

Dole

WORLD'S LARGEST FRUIT CANNERY

275,000,000 CANS OF PINEAPPLE PRODUCTS are grown, processed and packaged each year by DOLE. This fruit, picked from 30,000 nearby acres, amounts to 40% of Hawaii's output. DOLE requires only 15 minutes to process a pineapple once it has entered the cannery. Growing a pineapple is a much slower process! It takes between 18 and 24 months for a new plant to produce a mature fruit. Each year, 100-million slips are planted by hand. One man inserts about 8,000 slips into the ground in an 8-hour day.

Circle 554 on postcard, page 33

ALL YOU NEED IS A WRENCH

AND A MAN TO USE IT!

Dresser® Couplings and fittings are the quickest, simplest, easiest and most economical way to make strong, permanent pipe connections. They are designed for long life under adverse conditions. They are designed to "live" in the ground...on the ground...above the ground—resisting corrosion and providing joints that best take earth shifts or the

vibrations of heavy machinery. New installations as well as repairs to existing lines are performed quickly, simply and inexpensively. The only tool required is a wrench, and any workman can install Dresser Couplings and Fittings with a minimum of instruction and supervision. Your nearby Dresser Distributor has everything you need. Call him today or send for Dresser's illustrated Complete Line Catalog. You can always specify Dresser—with confidence.

dmd

DRESSER

MANUFACTURING DIVISION
BRADFORD, PENNSYLVANIA

DRESSER INDUSTRIES, INC.

OIL • GAS
CHEMICAL
ELECTRONIC
INDUSTRIAL

STYLE 38 COUPLING
For joining and repairing plain end steel or cast iron pipe. Sizes ⅜" through 72" and larger.

STYLE 65, 90 AND 88 COMPRESSION FITTINGS
To join small diameter pipe and copper tubing, protect valuable machinery and equipment from vibration damage. Sizes ⅜" through 2".

STYLE 98 "KUPL+LOK"T.M.
Fittings and couplings for grooved end pipe. Combines pipe joining dependability with positive lock. For working pressures 500 psi and 1,000 psi. Sizes 2" through 8".

STYLE 63 EXPANSION JOINTS
Absorb concentrated expansion and contraction of exposed pipelines. Built to order. All sizes.

STYLE 4 AND 41 COLLAR CLAMPS
Seal leaks through threads without shutting down line. Ideal for repair of threaded couplings on process and other piping. Sizes ¾" through 12".

STYLE 118 "HANDIBAND"® REPAIR CLAMP
Repairs holes in steel pipes quickly. Resists corrosion and right for most line contents including oils. Sizes ½" through 8"; and 3", 6", 9", 12" lengths.

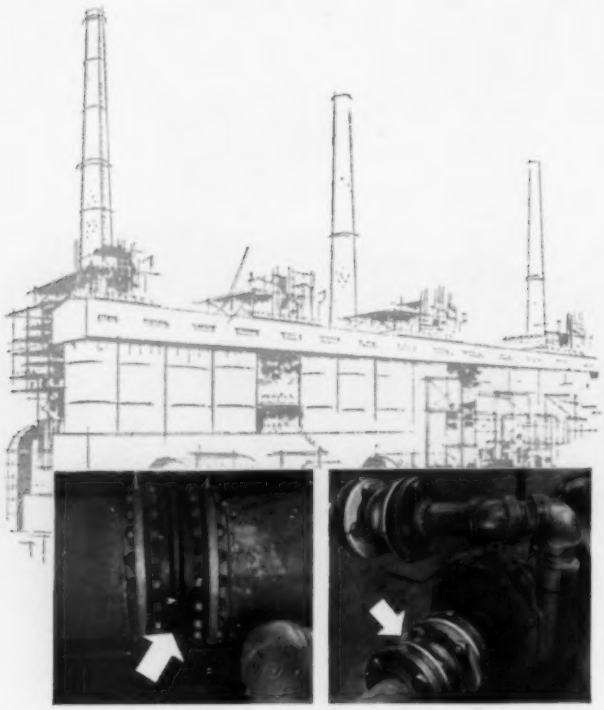
"360"® REPAIR CLAMP
Repairs holes and breaks in asbestos-cement, cast iron pipe with "all-around" pack. Sizes 2" through 14" in various lengths to 30".

STYLE 60 BELL-JOINT CLAMP
To repair leaks in cast iron bell-and-spigot joints. Also available in Style 60-S for leaks through CIP stab-joints. Sizes 3" through 60".

Circle 555 on postcard, page 33

ENGINEERED PRODUCTS

for Plant Maintenance



Typical installations show Garlock Rubber Expansion Joints on a 26" vacuum condenser inlet (left) and 2½" suction and discharge pipes. Garlock furnishes standard joints from ¾" to 72" in pipe diameter, and in all shapes.

Install Garlock Rubber Expansion Joints. It's good piping practice; here is why:

1. Prevent stresses. Piping systems expand and contract with temperature changes. Garlock Expansion Joints act as a "breather" . . . compensate for expansion and contraction.

2. Eliminate vibration and noise. Pumps, compressors, engines, and pressure surges in pipe lines create vibration and objectionable noises. Garlock Rubber Expansion Joints act as an absorbent cushion . . . reduce vibration and insulate against transfer of noise to other parts of the building.

3. Compensate for misalignment. Piping and mechanical equipment often move out of normal alignment during operation due to wear, load stresses, or settling of buildings. Garlock Rubber Expansion Joints compensate for this and prevent possible breakdowns of equipment. They also make installation easier since alignment of piping and equipment need not be as accurate when expansion joints are used.

4. Reduce flange breakage. Undue stress caused by misalignment, vibration, expansion or contraction of piping or equipment, will break the metal connecting flanges. Garlock Rubber Expansion Joints relieve such stresses.

Offer many application advantages. Garlock Rubber Expansion Joints outlive metal ones; do not crack, corrode, lose shape, or require gaskets. The sturdy construction of Garlock Rubber Expansion Joints results in satisfactory service where pressures are as high as 150 p.s.i., temperatures to 180°F.

Expansion joints are also available for service up to 450°F. In the photo of the joint cut in half, the arrow points to a steel reinforcing ring which, when varied in number with the joint size, provides the extra strength needed for the most severe applications.

For more data, call the nearest of the 26 Garlock sales offices and warehouses throughout the U.S. and Canada. Or, write for Catalog AD-137, Garlock Inc., Palmyra, N.Y.

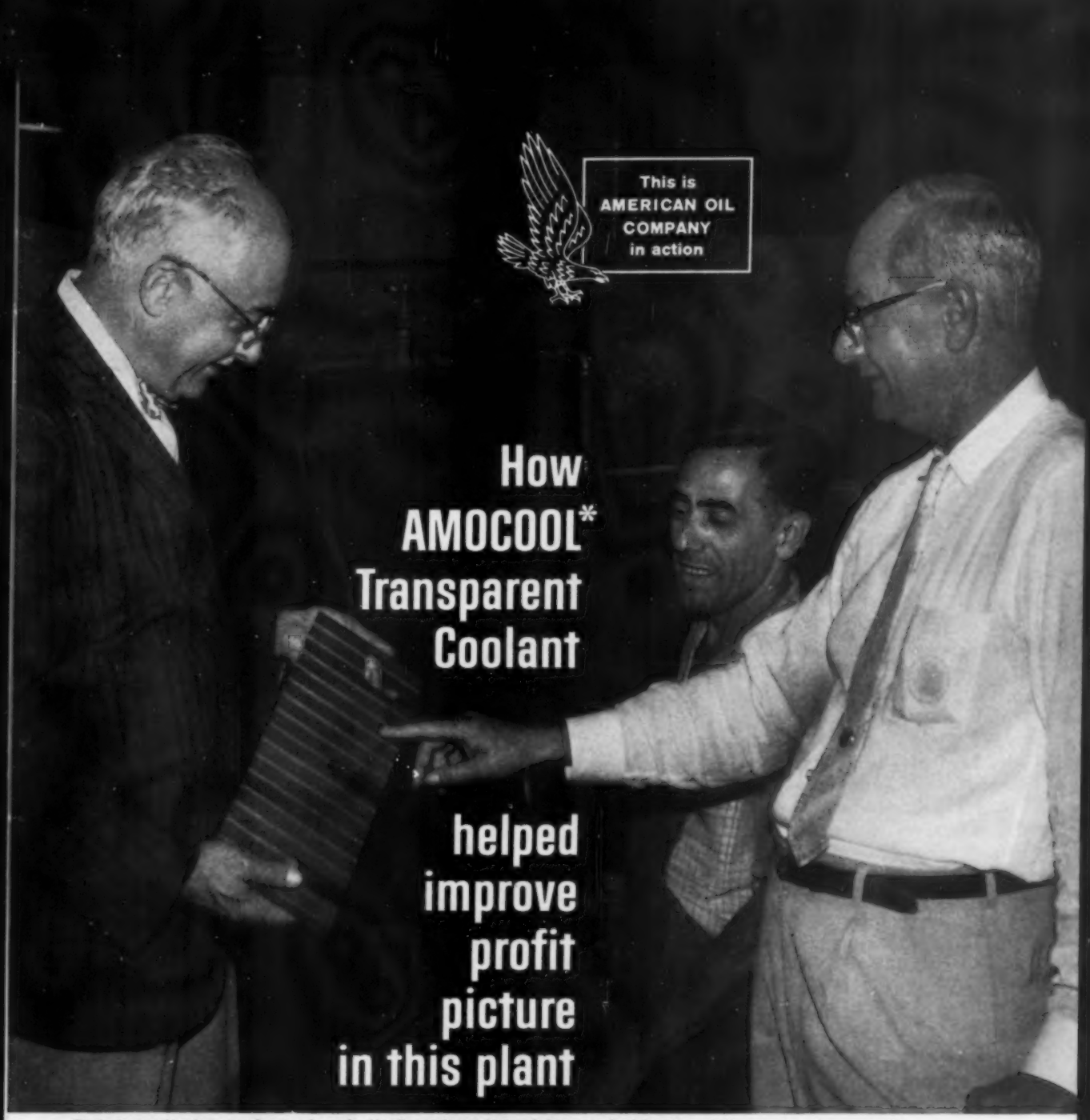
GARLOCK

Canadian Div.: Garlock of Canada Ltd.
Plastics Div.: United States Gasket Company.

Order from the Garlock 2,000 . . . two thousand different styles of Packings, Gaskets, Seals, Molded and Extruded Rubber, Plastic Products.

*DuPont Trademark

Circle 556 on postcard, page 33



How AMOCOOL* Transparent Coolant helped improve profit picture in this plant

Eliminate reworking because of rust, reduce wheel loading and extend intervals between wheel dressings; do these and you increase profit per unit, explains Detroit Edge Tool president, Dan Ebbing, to P. E. "Pappy" Stratton of American Oil. Sam Vineh, operator, looks on.

by PAUL E. "PAPPY" STRATTON

About the Author.

"Pappy" Stratton has been providing technical help on lubrication and metalworking problems to customers in the Detroit area for nearly all of the twenty-five years he has been working for the company. In addition to having this store of practical experience to help him, Pappy has completed the Company's Sales Engineering School.

☆ ☆ ☆

By using a soap-base grinding compound, Detroit Edge Tool Company was getting excessive corrosion and rust on work and grinding machines. Oil vapor was collecting on machines and on the ceiling, causing dirty working conditions. Most important, high wheel loading was causing frequent down-time for wheel dressings.

We worked out a test program on AMOCOOL Transparent Coolant with the management. On our first test on one surface grinder, feed pressure was cut substantially while at the same time metal removal was increased.

The cost of reworking parts to remove rust was eliminated. Time required to clean machines to get rid of the odor was cut in half. Less wheel loading and fewer wheel dressings have upped production and reduced costs. Our test program paid out in an improved profit picture. All grinding and drilling equipment has been converted to AMOCOOL Transparent Coolant.

☆ ☆ ☆

Would you like this kind of technical help to assist you in improving profits? Get it by calling the American Oil Company office nearest you.

*Trademark

AMERICAN OIL COMPANY

AMERICAN

910 SOUTH MICHIGAN AVENUE
CHICAGO 80, ILLINOIS

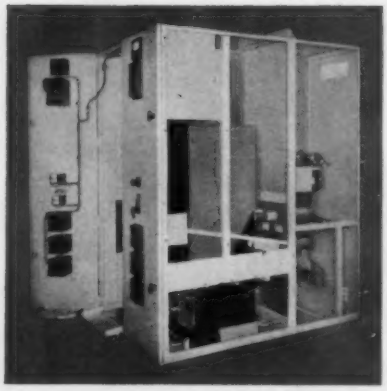
Circle 557 on postcard, page 33

More features make Westinghouse metal-clad switchgear

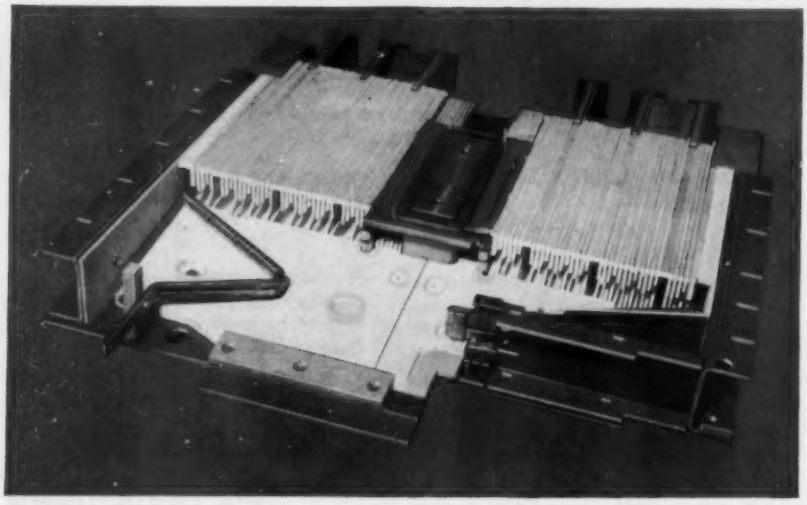
Westinghouse metal-clad switchgear is design proved in the Westinghouse High Power Laboratory. It meets all industrial, electric utility, commercial, institutional, and other needs for 75 to 1000 mva service inclusive, 4.16 through 13.8 kv.

Check below for advantages of this equipment that are of major importance to you.

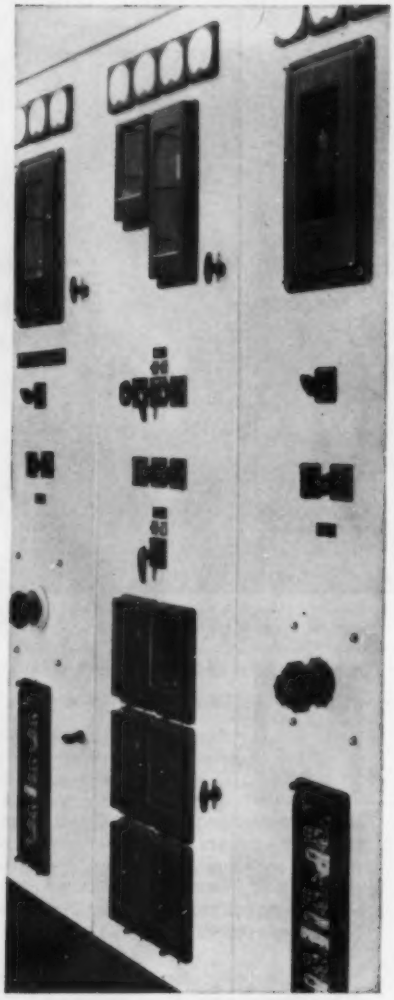
For further information, call your Westinghouse representative or write for a copy of Descriptive Bulletin 32-250 to Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa. *You can be sure . . . if it's Westinghouse.*



Balanced insulation protection is provided by the exclusive "Limitrak" insulation system on bus supports, arc chute enclosure and breaker bushings.



Fast, positive circuit protection is provided by the De-ion principle of arc interruption with center coil arc chute design.

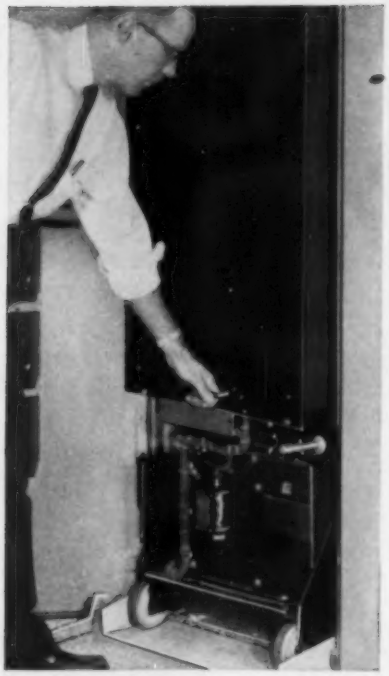


Adequate space for varied relaying and instrumentation is assured by full height front panels.

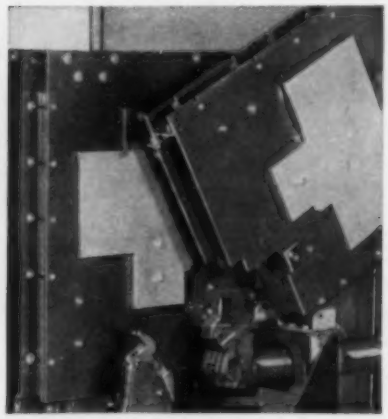
your best buy

Proper component functioning is verified by a continuing program of production inspection and testing.

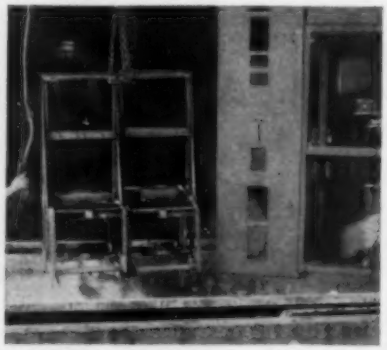
Front panel is protected during assembly, shipment and installation by strippable plastic coating.



Simple, quick inspection, maintenance and replacement of DH breakers is made possible by horizontal drawout construction.

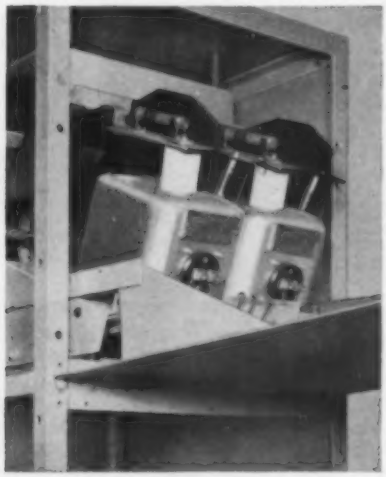


Hinged arc chute permits easy tilting for inspection and maintenance of contacts with DH breaker in drawout position.



Thorough phosphatizing and priming treatment safeguards against corrosion and provides a superior base for finish coat.

Complete joint sealing with polyester compound at main contact supports and main bus provides full insulation.



Personnel are protected by separate compartment drawout-type mounting of potential transformers.

Westinghouse

J-61014

Circle 558 on postcard, page 33

"WE SELL PROTECTION—NOT PAINT!"

That's how Du Pont Technical Representative Steve Ip approaches problems of paint maintenance. "The only true measure of value in any paint program," Steve explains, "is how well it protects your investment in plant and equipment—not how much you paid for the paint per gallon.

"At Du Pont, we insure dependable, long-term protection two ways: highest quality finishes formulated to meet specific needs, plus expert technical help in how to use them. The two test specimens I'm holding here, for example, were coated with our DULUX® Metal Protective Finishes. You can successfully combat about 85% of your corrosion problems with these time-proven paints—with substantial reductions in costs!

"But we're not content just to make recommendations. We prefer to make a complete study of your particular maintenance problem. Then, drawing on our own experience, we can develop a painting program that takes into account all your individual needs. Believe me, service like this goes a long way toward helping you achieve lasting protection, at lowest cost per square foot per year!"

Over 10 years' experience with corrosion problems makes Steve Ip typical of the able, expert help you can expect from Du Pont. Why not call your local Du Pont district sales office the next time you have a corrosion problem? For facts on the finishes mentioned here, just clip and mail the coupon below.

E. I. du Pont de Nemours & Co. (Inc.)
Finishes Division, Department PE-19
Wilmington 98, Delaware

☐ Please send me, without obligation, technical bulletin on DULUX Metal Protective Finishes.

☐ Please have Du Pont Technical Representative schedule a call.

Name_____

Firm_____

Address_____

City_____ Zone____ State_____

MAINTENANCE PAINTS

DU PONT

REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING...*THROUGH CHEMISTRY*

Circle 559 on postcard, page 33

Circle 560 on postcard, page 33 →

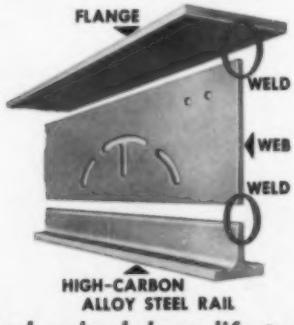
CLEVELAND TRAMRAIL
ANNOUNCES

TARCA TRACK

A MAJOR TRACK DEVELOPMENT FOR OVERHEAD MATERIALS HANDLING

Continuous automatically–controlled welds

Flange, web and rail joined by continuous automatic welds assure reliability.



Hard, raised, long-life treads

Rail especially rolled of high-carbon alloy steel for maximum durability. Treads are extra hard, raised, flat and smooth—for easy load movement—prevent peening—longer wear.

another exciting "first"

An outstanding advancement in a long series pioneered by Cleveland Tramrail to make it the leader in the overhead materials handling equipment industry. An entirely new track that had to be great to be better—result of years of research.

a far better track

Balanced design with parts proportioned exactly to provide maximum strength with minimum weight. Greater rigidity to withstand severe working conditions.

easier, faster to erect

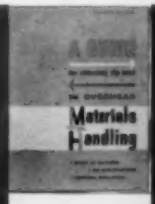
Straight, true, smooth. All dimensions held to greater accuracy. Tarca Track matches with existing Cleveland Tramrail installations.

large range of sizes

10 standard sizes from 8″ to 20″ deep. Special sizes can be fabricated for unusual applications.

Ask for this helpful booklet—No. 2032

Covers all major features the buyer should know about overhead materials handling equipment. Has complete story on Tarca Track. Contains detailed equipment specifications and handy proposal evaluation form.



CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO
5899 EAST 284th STREET · WICKLIFFE, OHIO

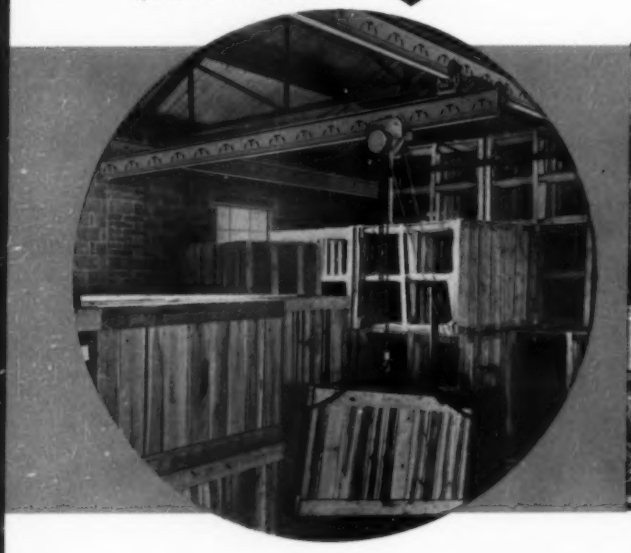
Most Installations of Cleveland Tramrail Equipment pay for themselves within one or two years.

Trade–mark of durability and strength —punched into all Tarca Tracks.

One of the more recent important materials handling developments initiated and engineered by Cleveland Tramrail for the Wire and Rod Industry is the hydraulically-operated grab for storing coils in vertical piles. This device picks up several coils at a time and works in either vertical or horizontal positions.

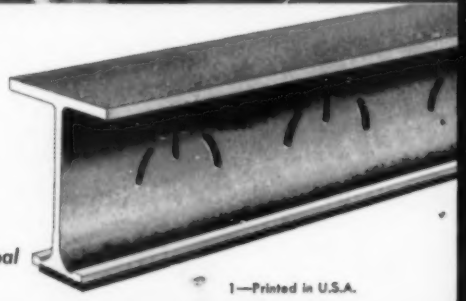
Simple inexpensive hand-propelled Cleveland Tramrail cranes are filling a mighty important need in a vast number of places. For instance, in this warehouse of a glass distributor, heavy awkward cases are handled by one man and piled high, thereby utilizing the storage space to the maximum.

Cleveland Tramrail gantry cranes have long been popular because they increase efficiency of many local handling situations. They will operate under overhead cranes without interference. Tramrail gantries are built in many types and sizes, with manual or electric drives.



Your Cleveland Tramrail Sales Engineer is Qualified to give you the Complete Design and Application Story on This Revolutionary

NEW TARCA TRACK



Cleveland Tramrail is represented by competent, experienced engineers in all principal cities of the United States and Canada. Contact address on other side.

1—Printed in U.S.A.

ONE OF A SERIES OF CHATS ABOUT THE CONSERVATION AND CONTROL OF HEAT

SARCO TOPICS

STEAM CONSUMPTION WAS ERRATIC AT THE SHERATON-ATLANTIC

This is a documented steam story, and if you have the *least* interest in reduction of steam costs you'll read on. The events took place in the laundry and dry cleaning department of the Sheraton-Atlantic Hotel in New York, which purchases district steam; but they could have happened in *any* steam using establishment — including your plant.

This documentary is concerned with money — (their steam bills for laundry and dry-cleaning were tremendous) and how the Sheraton cut the bill $8500 in one year. That's giving away the climax, but not the plot. To begin with, the Sheraton engineering department kept a daily log which revealed excessive steam costs and startling discrepancies. For example, on one day, 44,000 lbs. of district steam were metered and 20,300 pieces finished. On another day, 38,000 lbs. of steam were metered and 23,300 pieces finished. Clue: This ratio was obviously cockeyed!

To relieve your suspense, we can tell you that the Sheraton removed competitive bucket traps and installed around fifty Sarco Thermo-Dynamic Steam Traps, Type TD-50, on the discharge side of each piece of steam heated equipment, and on drips on supply mains between meters and equipment, as recommended by Sarco. The results were dramatic. (Strong men didn't weep, but they did clap their hands a bit.) In the pre-Sarco December, 868,000 lbs. of steam were purchased for $1725. In the post-Sarco December, only 532,000 lbs. of steam were purchased, for $1025. And the volume of work had increased!

There are no crystal gazers on the Sarco staff; lots of competent engineers, though. These steam detectives find inefficient steam trapping at the bottom of countless high cost mysteries. Sad part of it is, the high cost of steam is only part of the story. Inefficiency in trapping can create other costly problems, too.

We talk a lot about our Thermo-Dynamic trap, don't we? So do other people. In fact we're quite used to grateful cheers of appreciation. Why don't you get the full story, by asking for it? Phone, telegraph, mail—choose your favorite medium of communication.

SARCOTROL! OUR WORD FOR SOMETHING SPECIAL IN TEMPERATURE CONTROL

It may be just what you've been looking for. We don't know. It's rather unusual. We know what it can *do*, but we still don't know everyone who needs it, even though we've been selling Sarcotrol successfully for many years to the plastic fabricating industry. New people we never heard of keep popping up saying it's just what they've needed.

When we designed Sarcotrol we planned it for specific use as a heating and cooling unit for injection molds, cylinders, rolls and drums. What surprises us is that so many different kinds of other equipment are evidently now in search of just such a control, from Banbury mixers to electric coffee pot testers.

The Sarcotrol is a portable, automatic temperature control system utilizing closed recirculation of the heat transfer fluid, to insure even temperatures throughout the equipment being heated and/or cooled. Here's the operating principle. Btu's are supplied to or removed from the rapidly moving high-pressure, high temperature fluid; the variations between delivery and return temperatures being held to a very narrow segment of the Sarcotrol's wide temperature adjustment range. A broad range of flow rates is available to handle widely varying heating and cooling loads, while maintaining tight control of temperatures across the equipment. The basic control mechanism is our own electric indicating controller. Four

standard, fully adjustable, working temperature ranges, cover all heating or cooling requirements between 0° and 300°F. (Keep reading . . . you can always go back for details.) On start-up, full heater capacity is available, and when circulating water approaches control point, heat input is automatically reduced for closer control. Temperature control instruments are automatically compensated for ambient temperature variations.

Heard enough? If not, you must feel a responsive chord vibrating, so write for details. There's literature available which contains much more information than we can give you in this chat.

OUR NEW PUBLICATION IS PRACTICAL—PLUS

SARCOSCOPE is our new house magazine into which we pour what we hope will be a useful mixture of ideas, case histories, tips, facts, news, and sense — both common and uncommon. If you are not receiving

it, we'll be happy to send future issues to you. Just send your name and address. Sarco publishes it as a service to people interested in the conservation and control of heat. We try to keep it down-to-earth, practical and useful.

SO YOU THINK YOUR PROBLEM'S UNIQUE?

Lots of hot water and steam is being wasted these days, in lots of ways. If your eyes glaze as you watch your steam bills mount or shut down your equipment for maintenance, you probably wonder what you did to deserve such problems. If it's any consolation, it's very unlikely that you are alone in your misery. The chances are excellent we have solved just such a problem already for plants similar to yours. Try us. Describe your problem in a letter. We'll probably be able to send you a set of Sarco Case Histories, describing how other plants were able to conquer problems like yours.

5897

SARCO

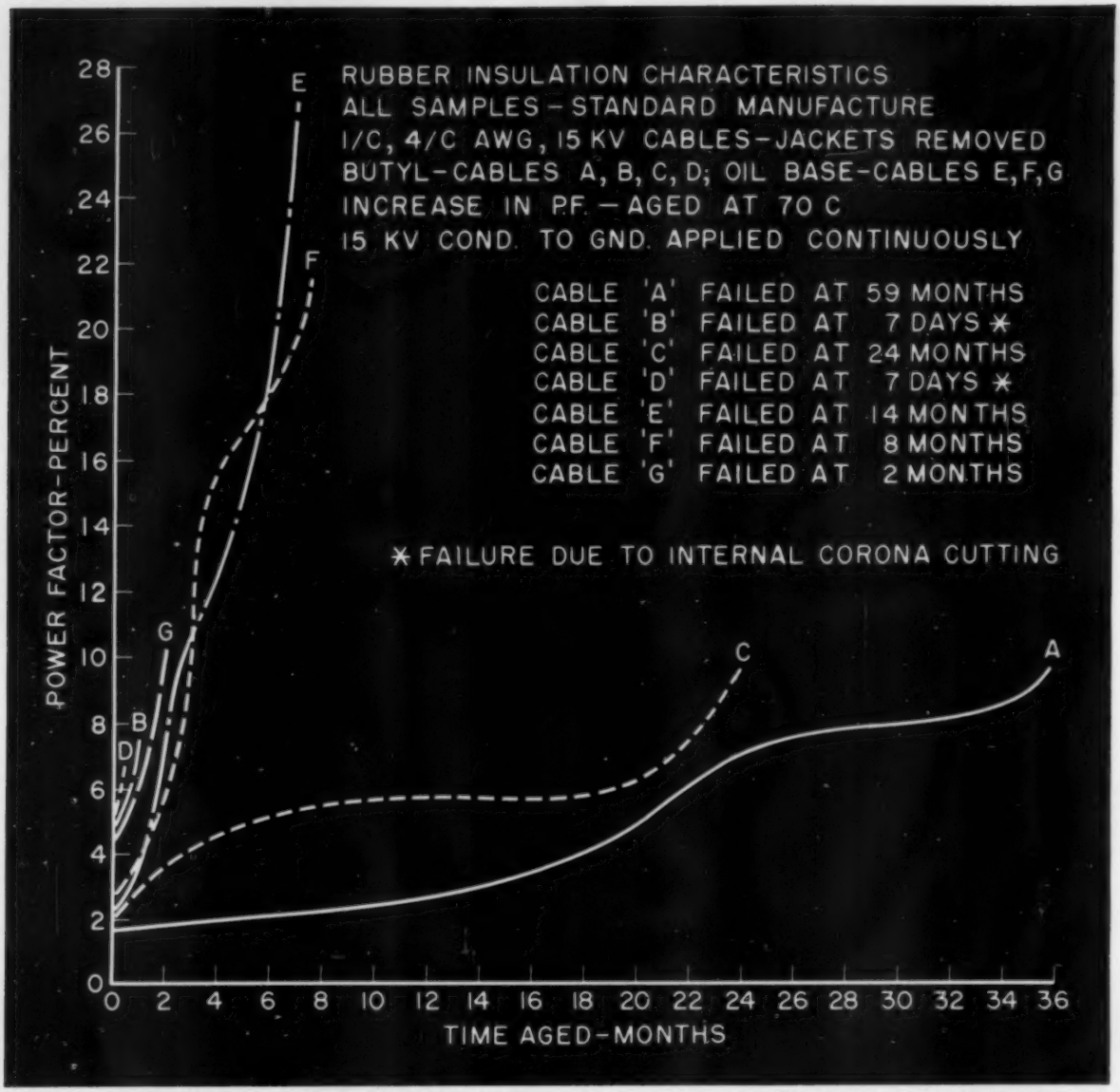
SARCO COMPANY, INC.
635 MADISON AVENUE, NEW YORK 22, N. Y.
PLANT: BETHLEHEM, PA.

STEAM TRAPS • TEMPERATURE CONTROLLERS
STRAINERS • HEATING SPECIALTIES

Sheraton Case History
Circle 561 on postcard, page 33.

Sarcotrol
Circle 562 on postcard, page 33.

Sarcoscope Magazine
Circle 563 on postcard, page 33.


RUBBER INSULATION CHARACTERISTICS
ALL SAMPLES - STANDARD MANUFACTURE
1/C, 4/C AWG, 15 KV CABLES - JACKETS REMOVED
BUTYL - CABLES A, B, C, D; OIL BASE - CABLES E, F, G
INCREASE IN P.F. - AGED AT 70 C
15 KV COND. TO GND. APPLIED CONTINUOUSLY
CABLE 'A' FAILED AT 59 MONTHS
CABLE 'B' FAILED AT 7 DAYS *
CABLE 'C' FAILED AT 24 MONTHS
CABLE 'D' FAILED AT 7 DAYS *
CABLE 'E' FAILED AT 14 MONTHS
CABLE 'F' FAILED AT 8 MONTHS
CABLE 'G' FAILED AT 2 MONTHS
* FAILURE DUE TO INTERNAL CORONA CUTTING
POWER FACTOR - PERCENT
TIME AGED - MONTHS
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28
A
B
C
D
E
F
G

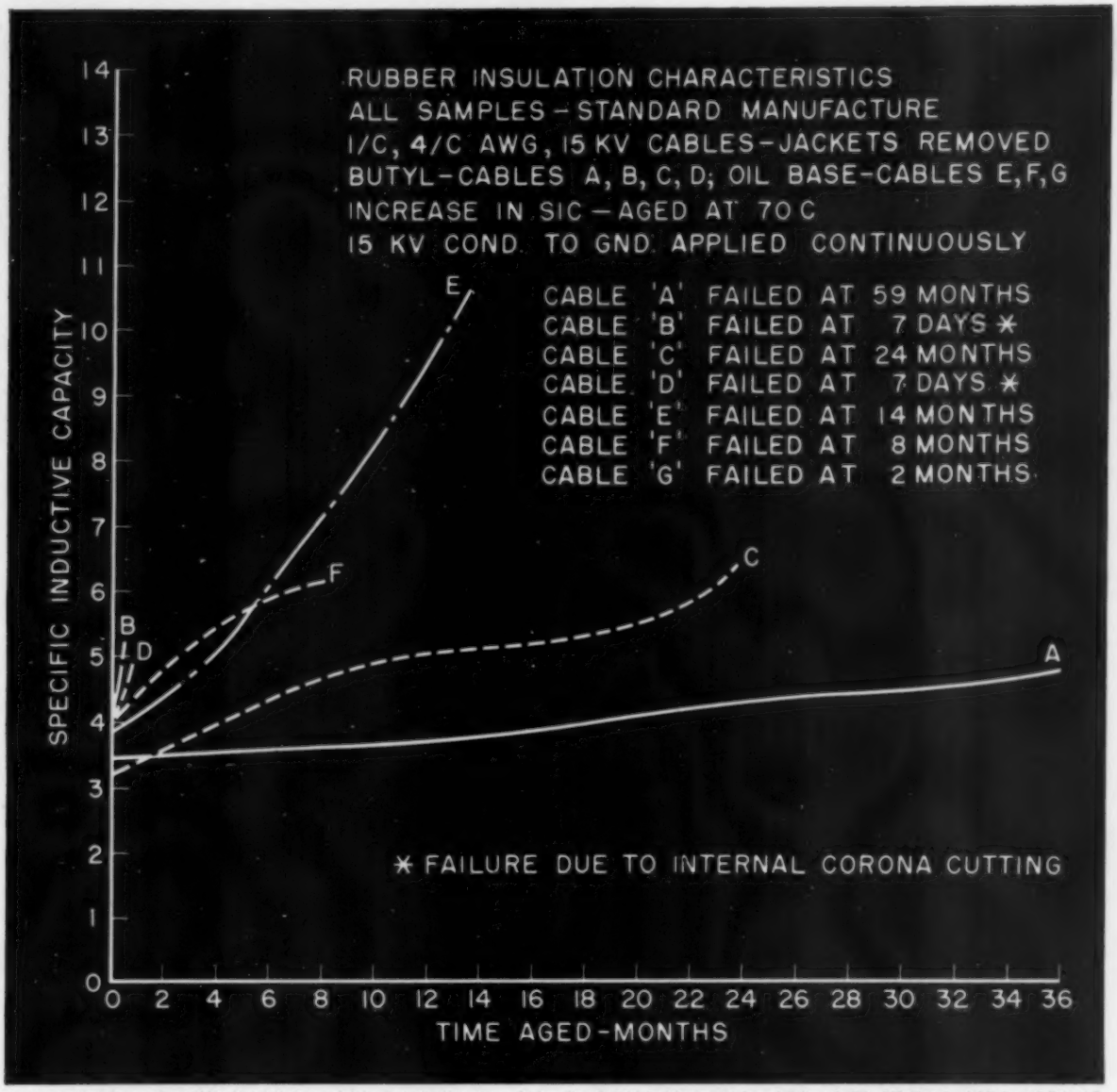
DURASHEATH LASTED TWICE AS LONG AS NEXT-BEST RUBBER CABLE. Cables were submerged in water heated to 70C, and 15000 volts conductor-to-ground applied

Anaconda

These accelerated-life tests prove

Anaconda proved the big difference in rubber insulations by buying competitive cables on the open market, taking a random sample of an Anaconda Durasheath cable out of stock, and running them all through a five-year *underwater test at 173% RATED VOLTAGE*. This extra-rugged non-standard test comes closer, on an accelerated basis, to correlating cable performance under actual operating conditions than any industry test. As you can see, Anaconda Durasheath ("A" in the chart) lasted more than twice as long as the next-best cable—59 months compared to 24 months.

Durasheath quality is the result of three factors: Superior compounds resulting from years of developmental research and constant improvement; advanced techniques of manufacture; and better ingredients. For instance, Anaconda Butyl (AB) insulation is compounded with only nonhygro-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15 KV COND. TO GND. APPLIED CONTINUOUSLY
CABLE 'A' FAILED AT 59 MONTHS
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CABLE 'F' FAILED AT 8 MONTHS
CABLE 'G' FAILED AT 2 MONTHS
SPECIFIC INDUCTIVE CAPACITY
TIME AGED - MONTHS
* FAILURE DUE TO INTERNAL CORONA CUTTING
A
B
C
D
E
F

continuously. Where other cables had failed completely, Durasheath's power factor (line A, left) had increased from 1.5 to only 7.1; SIC (line A, right) from 3.5 to 4.3.

proves it!

there is a difference in rubber insulations

scopic fillers to prevent increase in power factor by moisture absorption.

Durasheath's superiority is now further improved by a uniquely new "Uniblend" mixing process which literally homogenizes the Butyl mixture, disperses all the components thoroughly to prevent variations in the high dielectric strength of Anaconda Butyl (AB) insulation.

For more facts on Durasheath and Anaconda's new Uniblend mixing process, contact Anaconda Wire and Cable Company, 25 Broadway, New York 4, New York, Department EFL-2-PE. 61249

ASK THE MAN FROM

ANACONDA®

FOR DURASHEATH BUTYL-INSULATED CABLE

Circle 564 on postcard, page 33

COURT DECISIONS —a summary of legal findings of interest to the plant engineer

Prepared by Albert Woodruff Gray

Engineer as Architect

PROSECUTED AND found guilty of appropriating the title of architect, a registered professional engineer appealed. The Supreme Court of that state affirmed his conviction, and said,

"We conclude that while all architects may be engineers, all engineers are not architects. To restate these truths in one proposition, some engineers are architects. The legislature confirmed this inference when in 1945 it made requisite a special and classificational licensing of architects as such and enacted a separate statute for such a purpose in addition to the earlier engineering licensing act of 1935.

"While the respective functions of an engineer and those of an architect as recited in the two statutes superficially appear parallel and equivalent as predicated for each group they are designedly not so. Notably in the instance of architects, studies, plans, specifications, etc., are coupled conjunctively with 'a coordination of constructural factors concerning the aesthetic.'

"That element is absent from the engineering law. And although the Architect Licensing Act states that it regulates as to the performing of 'any other services in connection with the designing or supervision of construction of buildings located within the state, regardless of whether such persons are performing any or all of these duties,' architecture connotes the fulfillment of such duties—which are fundamentally done very well by engineers—in an ulterior manner and with certain finesse not indispensable to the vocation of basic engineering." Court brief 165 Atl. 2d 433, Oct. 4, 1960.

Equitable Adjustment

CONTRACT WAS made by the United States Government with a rubber company for containers to be used in the shipment of missiles. Torsion bar lever arms were designed to hold the missile in place. The rubber company sub-contracted some of the work to another company. The contract stipulated:

"We may at any time by written order, make changes in any of the drawings, designs, specifications, methods of shipment or packing and place of delivery. If any such change causes an increase or decrease in the cost of the unit price of the articles ordered, an equitable adjustment shall be made in the contract price by amendment thereto. If any change affects the estimated cost of, or time required for the performance of the work, an equitable adjustment shall be made in the fixed price or time of performance or both."

Change of plans under this clause caused the plant of the subcontractor to remain idle for approximately 30 days. In determination of the adjustment for this loss the subcontractor contended that this phrase, equitable adjustment, applied both to the unit price and also to the overhead loss from plant idleness as in this instance.

Interpretation of the phrase by the federal court in its decision of the action brought by the subcontractor was, "This court is of the opinion that the term 'equitable adjustment' does not include indirect costs as claimed by the subcontractor.

To this was added in conclusion, "The subcontractor is not entitled to recover for loss of overhead or use of its premises during the time the stop order was in effect inasmuch as an equitable adjustment has been made with this subcontractor as provided in the contract." Court brief 186 F.S. 904, July 19, 1960.

Use of Telephone for Fraud

TELEPHONE MESSAGES between Virginia and Maryland were used in the promotion of a scheme to defraud. One of the parties to this scheme was indicted and convicted of a federal statute violation. The statute stated:

"Whoever having devised or intending to devise any scheme or artifice to defraud, or for obtaining money or property by means of false or fraudulent pretenses, representations or promises, transmits or causes to be transmitted by means of wire, radio or television communication in interstate or foreign commerce, any writings, signs, signatures, pictures or sounds for the purpose of executing such scheme or artifice, shall be fined not more than $1000 or imprisoned not more than five years, or both."

Attack on the constitutionality of this statute was based on the argument that it prescribes no rule by which to determine the nature of the sounds to which the statute refers and as a consequence is "so vague that men of common intelligence must necessarily guess at its meaning."

The Federal Court of Appeals asserted, "We are of the opinion that the statute does not violate the constitutional principle relied upon. The word 'sounds' must be construed together with their transmission by means of interstate wire, radio or television communication.

"So considered, the word is restricted in scope and there is no necessity for a man of common intelligence to guess at its meaning or to have any doubt about it including the voice or speech of a human being." Court brief 183 F.S. 683, Nov. 10, 1960.

Trade Secrets

AFTER SEVEN years' employment by a manufacturer of plastic extruding machines, a sales engineer left the company and organized his own business in direct competition with his former employer.

When suit was brought to prevent his disclosure of confidential information and the use of his former employer's blueprints and data, his defense was (1) that he had occupied no confidential position, (2) that he had no confidential information or trade secrets and (3) that any documents or blueprints he had retained contained no confidential information or trade secrets.

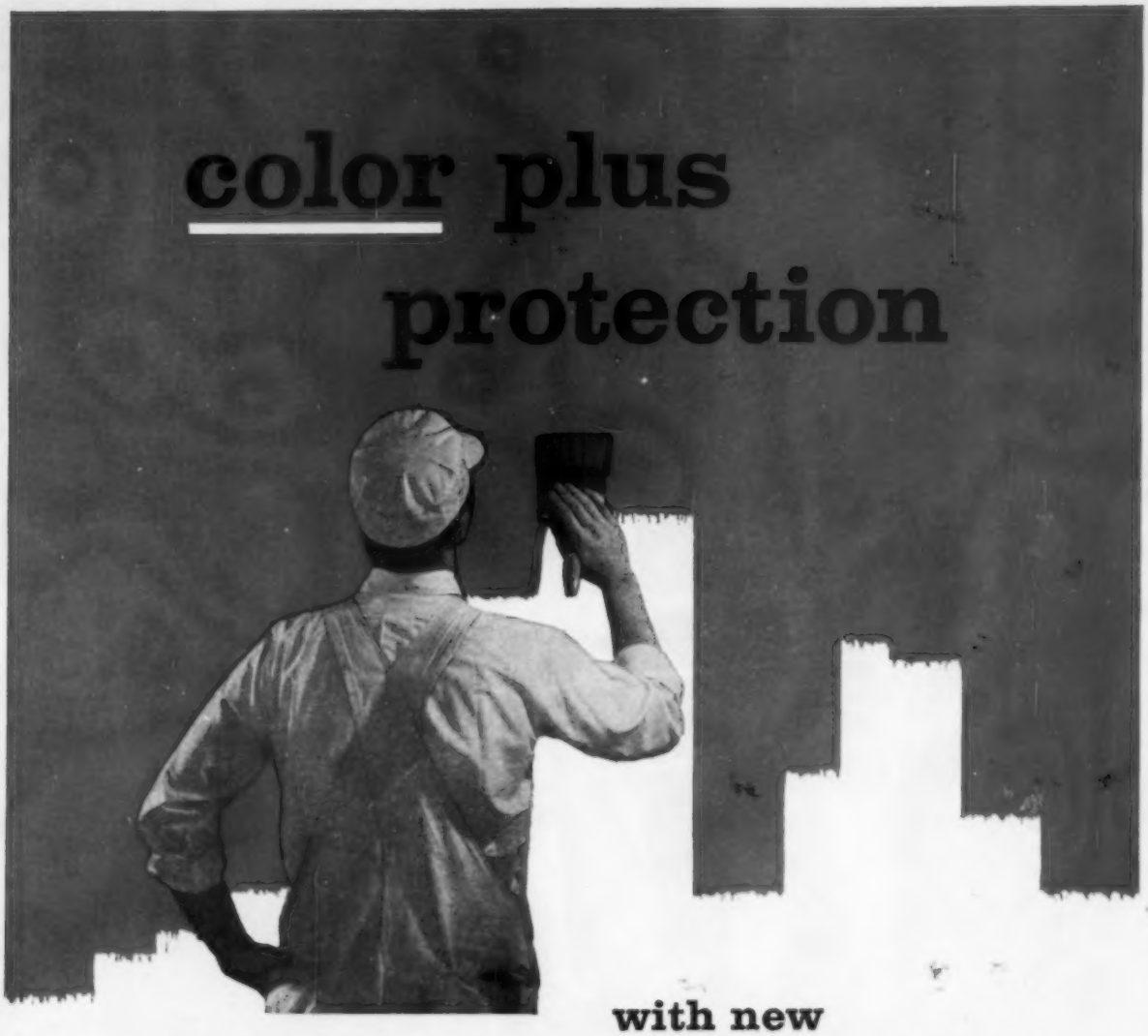
In holding that information relating to customers and the business acquired by this sales engineer was not within the definition of trade secrets, the federal court said,

"A trade secret is a process or device for continuous use in the operation of a business. Generally it relates to the protection of goods, as for example, a machine or formula for the production of an article.

"It may relate however, to the sale of goods or to other operations of the business, such as a code for determining discounts, rebates or other concessions in a price list or catalog or a list of specialized customers or a method of bookkeeping or other office management.

"However, matters of public knowledge or of general knowledge in an industry cannot be appropriated by one as his secret. Matters which are completely disclosed by the goods which one markets cannot be his secret. An exact definition of a trade secret is not possible; pertinent factors vary in each instance." Court brief 185 F.S. 598, July 22, 1960.

color plus protection



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Attractive colored aluminum paints provide heat reflectivity and insulation benefits. In addition, they protect metal and other surfaces from corrosion, rust and weathering. They're easy to apply by brush, roller or spray gun. Ideal for interior or exterior use, for roofing or equipment, for coding pipe or beautifying and protecting buildings.

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The Finest Paints Made with Aluminum are made with REYNOLDS ALUMINUM PIGMENT

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Circle 565 on postcard, page 33

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lubrication could do this job in 10 seconds... and do it better!

stop squirting profits away

automatic lubrication is the key to lower costs / longer parts life / higher production

Hand lubrication of automated machines drains the profits the machines were designed to deliver. And even a dozen men giving full attention to a single machine could not match the precise performance of an automatic system.

Automatic lubrication is based on the frequency concept . . . the regular application of small, measured amounts of refinery-pure lubricant directly to the bearings. Precision parts stand up under constant high-speed service with a fraction of the wear shown by hand-lubricated bearings. Never too much or too little lubricant . . . never an overlooked bearing.

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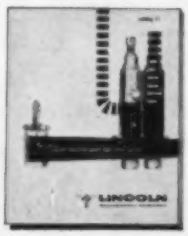

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Circle 566 on postcard, page 33

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Mahon has designed, built and installed complete finishing systems for Caterpillar Tractor Corp. (makers of all types of farm equipment) and Scovill Mfg. Co. (major supplier of cosmetic containers).

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No matter what your end-product may be, if your production processing requires metal-cleaning, rustproofing or any-type finishing from heavy-duty enamels to sales-stimulating lacquers, you can 'lean' on Mahon's Industrial Equipment Division. Here's an organization with the broadest finishing experience . . . and the one-source capability for planning, engineering, fabricating, erecting and servicing that means quality and efficiency at lowest true cost. Mahon designs industrial equipment but *engineers results from start to finish.* If you are interested in new or improved finishing facilities, Mahon would like to work with you in doing the job right.

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YOUR BIGGEST VALUE IS IN MAHON'S PLANNING AND ENGINEERING EXPERIENCE

MAHON

Circle 567 on postcard, page 33

Circle 568 on postcard, page 33→

PROTECTED FLUORESCENT . . .
Features a new line of completely corrosion-resistant units. With simplified telescopic monel metal lampholders and porcelain enameled cover frame. Seamless one-piece porcelain enameled housing. Easy to maintain, durable under the most adverse conditions. 2 or 3 lamp, 48". With a variety of glass or acrylic covers. U.L. listed.

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with the industry's broadest line of

PROTECTED LIGHTING

DUST-TIGHT
for Class II—group E, F and G or Class III locations.

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for Class I group C and D locations

VAPOR-TIGHT
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For more than 50 years Benjamin has been solving industrial lighting problems of all kinds. Every application means an individual problem. Only Benjamin has the answers, because only Benjamin's years of experience could have engineered this line of specific-need industrial lighting fixtures. That's why Benjamin is the greatest name in the lighting market today. Fluorescent, incandescent . . . high bay, floodlighting, protected . . . are just a few of the many in this complete line.

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Carefully designed for maximum lighting efficiency and protection in adherence to the National Electrical Code. Closed bead reflector, porcelain enamel finish, corrosion resistant. U. L. listed.

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207 East Broadway, Louisville 2, Kentucky
The World's Largest Single Source of Lighting for Commerce, Industry and Home.

new electronic order processing drastically reduces your electrical apparatus renewal parts inventory

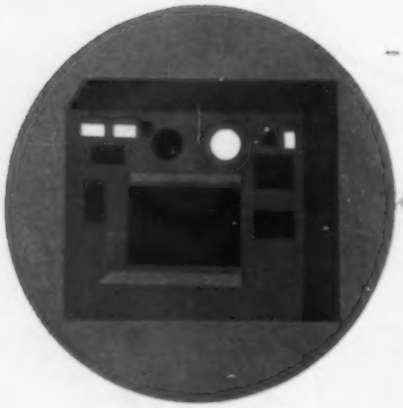
1

Customer phones or mails his order for renewal parts to his local Westinghouse sales office.

3

A computer in the Pittsburgh order processing center determines that the order can be filled from the Westinghouse warehouse which regularly serves the customer and transmits the required information to that warehouse. The teletype receiver in that warehouse goes into action and produces all shipping forms.*

*If the nearest warehouse inventory records show insufficient stock, the computer would review—immediately and automatically—the inventory of other nearby warehouses which could ship. Then shipping information would be teletyped to the closest warehouse with stock and shipment would be made from there—all within the same 30 minutes.



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The new Westinghouse automatic order processing system puts every renewal parts order on the shipping platform . . . on its way to you . . . in 30 minutes.

This fantastically fast, accurate service is made possible by linking the Westinghouse teletype network . . . the world's largest industrial network . . . with an Electronic Data Processing installation in Pittsburgh. This automatic system compresses days into minutes. This new service, coupled with constantly improving rail, truck and air freight schedules, enables you to attain production and inventory efficiencies in your maintenance parts stocks that . . . up to now . . . you could only wish for.

With this new concept in distribution, you can reduce capital investment in renewal parts and help eliminate production downtime.

Take advantage of this exclusive, 30-minute order handling system for all your renewal parts requirements. Call your local Westinghouse sales engineer to place your next order . . . prove to yourself how quickly you can replenish your stocks with Westinghouse quality renewal parts. *You can be sure . . . if it's Westinghouse*

2

A teletype operator in the local Westinghouse office puts the order into code form on a paper tape which transmits it to the order processing center in Pittsburgh.

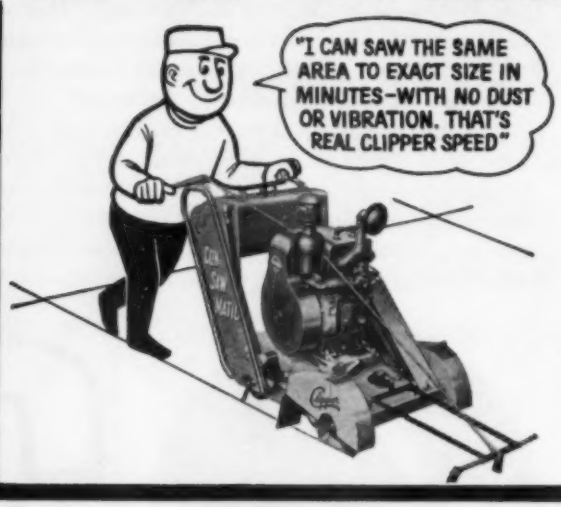
4

A warehouseman matches the teletyped forms to the proper part in stock and puts the order on the dock for delivery to the customer. An order placed anywhere in the country will be on the shipping dock within 30 minutes after it goes on the tape in Step 2. All paper work will have been done including automatic preparation of invoices for mailing to customer. All inventory records are automatically adjusted, even to ordering more of the item for the warehouse if stocks are low.

Westinghouse

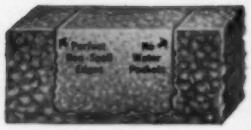
Circle 569 on postcard, page 33

Hold That Jackhammer...SAW FIRST AND SAVE!



use a Clipper CONCRETE SAW No need to cut a trench wider or deeper than the electric conduit, water, gas, sewer or steam line to be installed. Saw to repair damaged floors. Sawed joints in floors are smoother, last longer. Less material to remove, less to replace. Using jack hammers, minimum width of the openings is 14" with uneven edges causing future maintenance . . . also "clean-up" cost often amounts to more than the job itself. That's why manufacturing and processing plants, food, machine tools, newspaper —industrial plants of all types—use Clipper even while operating. CALL COLLECT for FREE DEMONSTRATION.

Get a perfect patch
LIKE THIS...



Note smooth, straight edges. Replacement material bonds better, patch lasts longer . . . water seepage eliminated. Sawed joint resists damage even under constant impact of steel wheel traffic.

Instead of one
LIKE THIS...

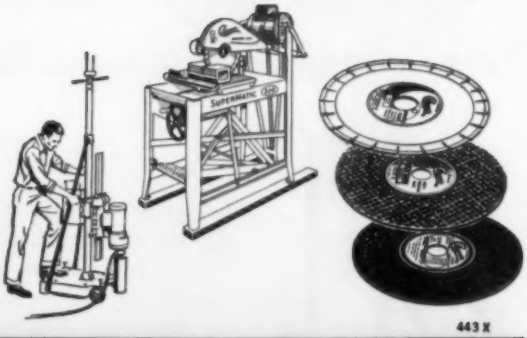
The weakened, feathered edges of this jagged patch job will chip and flake. Very possibly radial cracks far beyond repair area will present trouble here too. In all, it's a patch that won't last.

ask too about...

CLIPPER CORE DRILLS AND BITS World's first diamond core drills with sufficient speed and power for truly successful drilling of all types of masonry material, including the toughest reinforced concrete.

CLIPPER MASONRY SAWS cut every shape and size refractory and masonry material, wet or dry, in seconds—give you perfect reline jobs. Let a Clipper factory-trained representative show you in your plant why Clipper is the choice of 4 out of 5 Masonry Saw owners.

CLIPPER BLADES diamond and reinforced abrasive, for concrete and masonry saws. Can save you as much as 30%. Clipper blades saw more concrete and masonry materials than any other blades in the world.



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Circle 570 on postcard, page 33

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AUTHORIZED PLEXIGLAS DISTRIBUTOR

Here's why:

1. Material you order from your Authorized PLEXIGLAS Distributor is ready to use, cut in the exact sizes you want. SAVES YOU the cost of cutting operations and equipment, as well as scrap loss and waste.

2. Your Authorized Distributor promptly delivers the quantities required for current use, as you need them. You don't have to maintain inventory. SAVES YOU storage space, and the expense of materials handling, accounting and extra insurance.

Your Authorized PLEXIGLAS Distributor's stock includes almost any size and thickness of PLEXIGLAS® acrylic plastic . . . clear, colored, patterned and corrugated sheets . . . other plastics . . . extruded sheets . . . rods and tubes . . . and a wide range of accessory products. In addition, he is qualified to help you with fabrication and technical information. He is listed under PLEXIGLAS in the Plastics section of telephone directories in major cities.

Circle 571 on postcard, page 33

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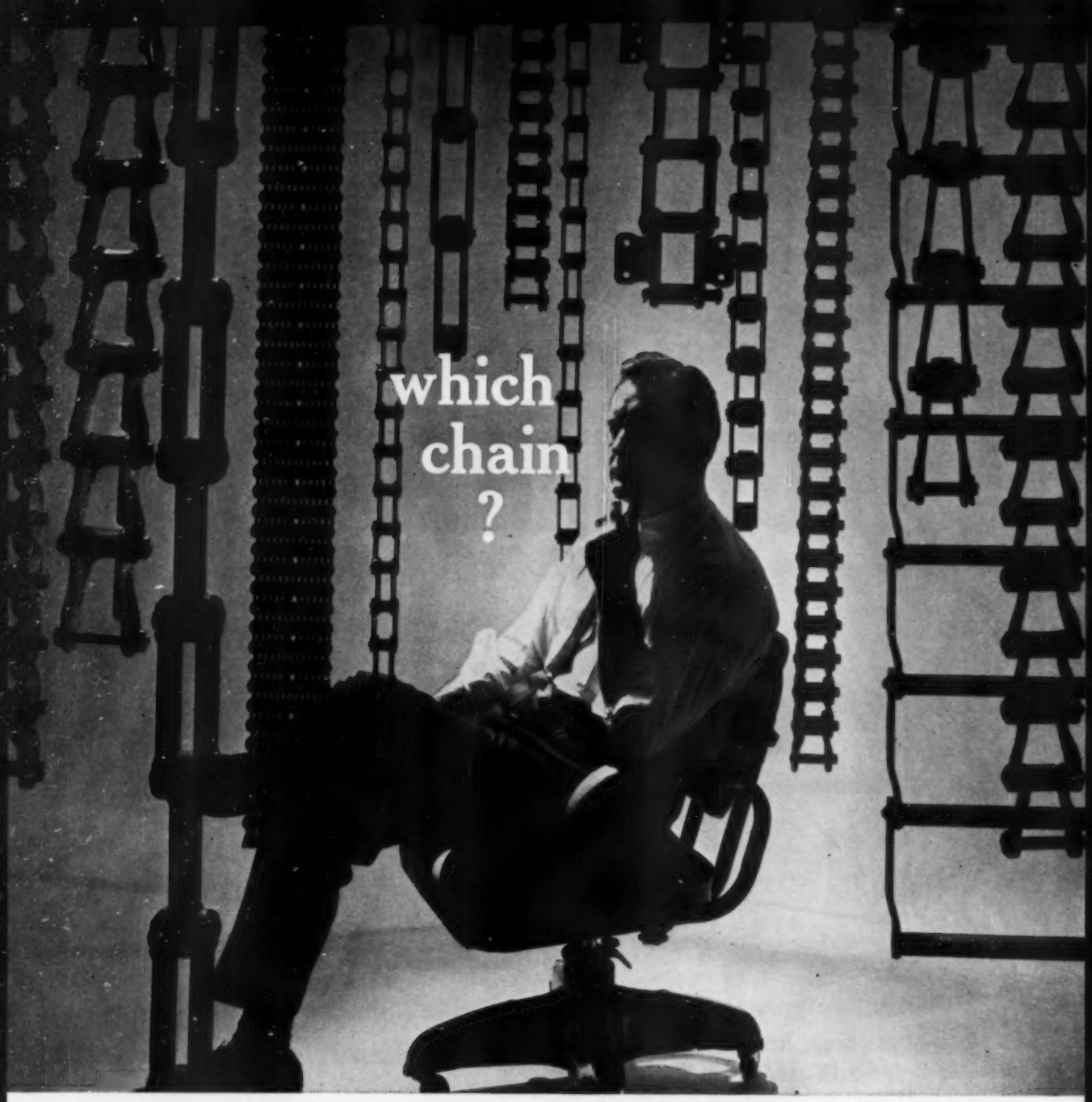

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Circle 572 on postcard, page 33

THE PLANT ENGINEER— KEY MAN IN INDUSTRIAL BUILDING

"Here it is . . . make it work." Too often, this is the plant engineer's introduction to the new plant his company has just built, in which he is expected to maintain the services and equipment that support production.

It just isn't good management—or good horse sense—to undertake the design and construction of a major production facility without enlisting the strong support of the man who knows most about the existing facilities—the plant engineer.

Sure, he can "pick up" the details of the plant, during the initial months of operation. But, how often will he pick them up *after* a failure that could have been prevented by more informed design?

We don't advocate "stamp out the architect" campaigns—but we do maintain that any architect's design is only as good as the information with which he has to work. And, standing high on the list of those who can provide the architect with the information he needs, is the plant engineer. Others can help, too—production people certainly know what they need in a new facility, and their advice can be most helpful.

It's the plant engineer, though, who knows the details—electrical load, steam demand, water supply needs, sewage volumes, structural loadings, lighting requirements—of the plant design that often are left to an outsider's educated guess.

And, following completion of the building design, what better liaison between architect, contractor and owner, than the plant engineer? In this capacity, he contributes to everyone's success; primarily to that of his company and himself, in the intimate knowledge of the new facility that he absorbs during its construction. Then, when management says, "Make it work," he'll already know the multitudinous details that make this new plant different from his old one.

In the field of industrial building, the plant engineer and his staff can be the "indispensable men." That a few industries in our country fail to recognize this fact is regrettable. In that failure, they lose the tremendous benefit that could be theirs—before, during and after construction.

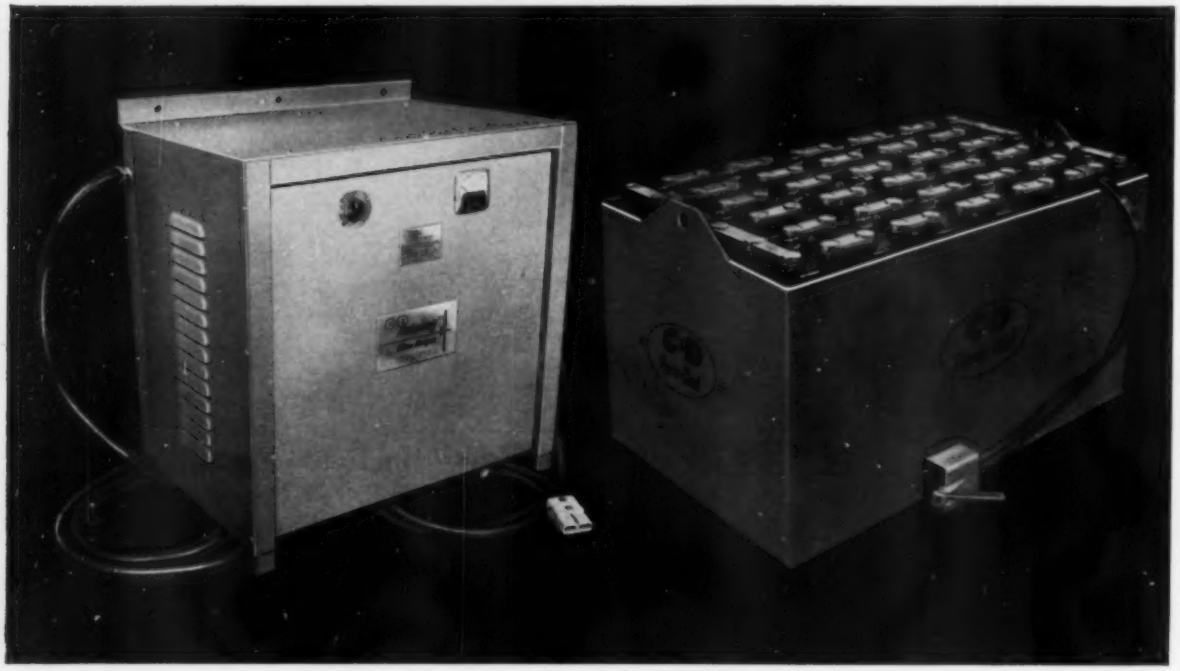
We believe that American industry should more intelligently tap this valuable source of industrial know-how—the plant engineer.

'Andy' Anderson

ANNOUNCING OPERATION 90

NEW PROGRAM FEATURING BATTERY-CHARGER COMBINATION ASSURES MINIMUM BATTERY COSTS FOR 90 MONTHS

FROM C&D!



Now, with C & D's Operation 90, you get a written warranty for your C & D battery and *AutoReg* charger.

The battery is C & D's *Slyver-Clad*® with *Hi-Impac** cell covers and containers. *Slyver-Clad* Five-Fold insulation and retention virtually eliminates shedding as a determining factor in battery life. *Hi-Impac* cell containers and covers, made of a unique shock-resistant material capable of withstanding a minimum impact of 150 inch-pounds, are practically unbreakable. Thus C & D's warranty provides for their replacement free of charge during the life of the battery.

The Operation 90 program charger is an *AutoReg*® static rectifier charger that automatically provides the proper charge for the battery. The *AutoReg* is the most modern, efficient charger available and is virtually maintenance free.

In C & D's Operation 90 program, you get single source responsibility for battery, charger, and service.

Complete details are in a new booklet. Write for a copy today. Learn how C & D's Operation 90 program can provide you with greater productivity, reliability, and profit from your electric truck fleet.

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DIV THE ELECTRIC AUTOLITE CO

Manufacturers of Slyver-Clad® Industrial Batteries • PlastiCell® and PlastiCal® Batteries for Communications, Control, and Auxiliary Power • Producers of AutoReg® Silicon Chargers and AutoCal® Charger-Battery Combinations

**Trademark, C & D Batteries, Div. The Electric Autolite Co.*

Circle 573 on postcard, page 33

INDUSTRIAL BUILDING

Design . . .

PRELIMINARY PLANNING

Three years of study—cost analyses, flow layouts, site comparisons and consolidation possibilities, went into the design of this plant. Page 104

Materials . . .

DESIGN FOR MINIATURIZATION

Problems, both in engineering and facilities design, increase as the size of your product decreases. Here's how one plant was designed to solve them. Page 108

Facilities . . .

DESIGN FOR EXPANSION

With its oversized utilities and service lines, and a maintenance core between its production floors, this plant is ready for expanding. Page 111

Construction

MODULAR CONSTRUCTION

To build this plant well—and on schedule—and within an established budget—the designers looked to modular design to do the job. Page 114

PRESTRESSED CONCRETE

From foundations to roofs, these two buildings used prestressed concrete columns, beams and slabs to advantage. An unusual design concept for industrial buildings. Page 117

Plus . . . a new building technique, with plastic foam and concrete, page 120; the story of a successful ponded roof installation, page 122; two new shapes in plywood invade the industrial construction field, page 125; make the plant floor fit the job by choosing the right material, page 128; and finally, a plant engineer takes a look at his new facility, three years later—an interesting study, page 131.

PRELIMINARY PLANNING

...A Must in Plant Design

By **MILTON J. MOORE**, Project Engineer, Construction, Parke-Davis and Co., Detroit, Michigan

CONSTRUCTION of our company's new surgical dressing manufacturing and division general offices at Greenwood, South Carolina, is moving ahead rapidly, with completion of the $4,000,000 project scheduled for early next year.

A primary reason for the relatively smooth and fast building progress at the site is that approximately three years of study, site analysis and design work had gone into the new facilities before construction began early this year.

In 1958, a committee was appointed by Parke-Davis management to study present and future operations of the firm's Surgical Dressings Division. This group was composed of representatives from the Engineering, Sales, Industrial Engineering, Controllers and Production Divisions. The committee was to determine how best to provide an efficient and integrate surgical dressings operation: either consolidate the activities at

Fig. 1, left. Model of plant now under construction. Feasibility, site location and design studies were used to insure best location, layout and utilization.

Figs. 2 and 3, below. At left, the company plant at Bridgeport, Conn.; right, plant at Versailles, Conn. Studies of these outdated building complexes showed it uneconomical to attempt upgrading of one or consolidation of both.

one of the existing plants—Bridgeport or Versailles, Connecticut—or construct a modern manufacturing facility at a new site.

To assist in this study, Parke-Davis retained Lockwood-Greene Engineers, Inc., one of the ranking textile engineering firms in the country. It is the normal policy of Parke-Davis to assign one of its own Project Engineers to co-ordinate and control the activity with the architect-engineers. Production Supervision, Industrial Engineering, and other divisions within the company were called on to provide assistance.

The basic objectives of this study were:

a. To forecast the Surgical Dressings Division sales for the next ten years.
b. To recommend ways of increasing net returns.
c. To estimate the cost of upgrading present facilities and equipment or relocation to a new site.
d. To arrive at a probable pay-out period to guide management's decisions on the future of the operation.

The committee, aided by the outside consultants, first reviewed the present Parke-Davis surgical dressings facilities in Connecticut.

Presently, Parke-Davis has 158,-

000 sq ft at the two locations, in a complex of multi-story buildings with limited areas and column spacing. The buildings at Bridgeport are nearly 50 years old while those at Versailles range from 10 to over 90 years. Painting, lighting improvement, replacement of wooden doors, renovation of office and employees' facilities are required. Ventilation, lint and dust control are needed. Confinement of production equipment within the present buildings imposes many limitations and precludes the optimum arrangement of equipment.

Almost immediately, the committee ruled out the renovation of both existing facilities because the expense could not be justified by any savings in labor, freight, taxes, utilities or maintenance. The total project cost was considered an expenditure for upgrading the appearance and material flow of the plant, and could not be economically recovered.

The possibility of consolidating the operations in one of the existing Connecticut plants was next studied. This plan provided for the general renovation of the Versailles Plant and the relocation of Bridgeport operations to Versailles. Space limitation precluded the relocation of Versailles operations to Bridgeport.

A new three-story building was considered, matching the floor levels of the existing buildings. The consolidation of operations would somewhat reduce the number of nonproduction personnel, interplant freight, taxes, and the amount of inventory maintained in the two separate plants.

Study by Consultants

Lockwood-Greene was engaged to determine: 1. Whether the consolidation should be at Versailles or at another location; 2. If another location were indicated, what area of the country would be most favorable?

When this study, summarized on this page, indicated that a new plant would be most feasible, the next step was the selection of a site.

The Engineering Division was asked to determine the ideal type of site, based on a plant layout which would produce the best operation from an efficiency and service standpoint. Engineering was extremely fortunate in being able to evaluate and define the site requirements before architectural and engineering designs were limited by a preselected site.

Our existing Versailles site met many of the criteria outlined. However, it does not have sufficient land for long-range, economical expansion, and it has no railroad service. Bridgeport was precluded as a possible location since it would be physically impractical to consolidate there.

The surgical dressing manufacturing operations are basically textile in nature. Over 87 per cent of the U. S. cotton textile industry is located in the southeastern region of the United States. Within this region, certain areas in Georgia, North Carolina, South Carolina, Tennessee and Virginia, met the site criteria better than areas in other parts of the country. The area (site and community) for relocating operations was determined by the area having the greatest economic and social advantages.

One hundred areas were considered. From this total, a list of 64 sites that generally satisfied most of Parke-Davis' requirements was tabulated. These were analyzed and selectively reduced in number by rating them against the preferred criteria and by comparison with each other. Forty-four of the sixty-four sites were eliminated by this procedure.

This process of elimination left seven communities with a total of 20 sites to be physically investigated. After this investigation, the three most desirable sites were presented in a report to management, indicating the order of preference. A 100-acre tract three miles east of Greenwood, South Carolina, was selected as best meeting the site criteria.

The prime aspect of the method used in the search for the most desirable site by Lockwood-Greene was the advance elimination of unfavorable sites, before any field trips were made. Detailed information on likely pieces of property was available on a current basis in their site files and new data was obtained from industrial development groups in the area being considered. After all sites that did not suit Parke-Davis' needs were eliminated, the preferred few were physically inspected. The final selection rested with our company.

At present, the production worker job assignments in surgical dressings manufacturing are varied and flexible, i.e. machine operators move stock and finished products, make up cartons, etc. In the Greenwood plant, however, materials and product movement will be mechanized with departments and machinery arranged for greater utilization of labor.

Flow diagrams, including machine and operator loading schedules, were developed for every stage of produc-

SUMMARY OF PRELIMINARY STUDY

1. **A new plant in a southern location offered savings over present operating costs.**
2. **Based on the total investment—plant, inventories, receivables, and present asset values, consolidation in the South presented the highest return on the investment.**
3. **A greater percentage of the investment in new facilities could be recovered than of a major investment in modernization of existing facilities.**
4. **A new single story plant offered opportunities in layout and equipment arrangement and economics in materials handling that could not be attained in the multi-story complex of small buildings.**
5. **Although the Versailles facility had sufficent land to meet the sales forecast, any major expansion would be limited by the topography of the site.**

SITE CRITERIA:

1. City sewer for receiving the sanitary and process wastes
2. Water source, natural or municipal
3. Good labor availability, preferably textile
4. Stable labor conditions
5. Fair taxes and legislative encouragement of industry
6. Located on a railroad
7. Located on a major highway where the plant would be prominently visible
8. Low cost fuel
9. Low cost electrical energy
10. An airport served by regularly scheduled airlines within reasonable driving distance
11. Suitable living conditions for relocated personnel including:
    a. Housing
    b. Churches
    c. Schools
    d. Hospitals
    e. Recreation, etc.
12. Satisfactory climate
13. At least 100 acres

tion from receiving, through warehousing, manufacturing, finishing, finished stock warehousing and shipping. This applied to all products and included every detail.

A team consisting of Production, Industrial and Construction Engineering positioned ⅛-in. scale paper cutouts of both existing and future machines on ⅛-in. grid paper. Each area was developed separately, based on product flow, with no attention given to size or shape. The areas were then combined to produce the over-all master plan. Over 20 combined area equipment layouts were required before developing the desired layout with a planned method for future expansion. The basic assumption was to combine receiving and raw stores with finished stock for better utilization of labor and material handling equipment.

Departments, and production areas within departments, were arranged for minimum handling and movement of materials. Machines were placed adjacent to each other where the output of one must be processed by another. Storage and supply areas were concentrated at a single shipping platform with truck access and railroad siding.

The next phase was the preparation of preliminary drawings, outline specifications and cost estimates for building construction work and services required for construction.

Nine drawings and three architectural renderings were presented to management at this stage of the project, to obtain their approval prior to starting working drawings and detailed specifications.

The buildings were to be one-story construction, with these floor areas: plant 173,000 sq ft; the office unit, 13,000 sq ft; the garage, 1800 sq ft; and a pump and heater building, 300 sq ft.

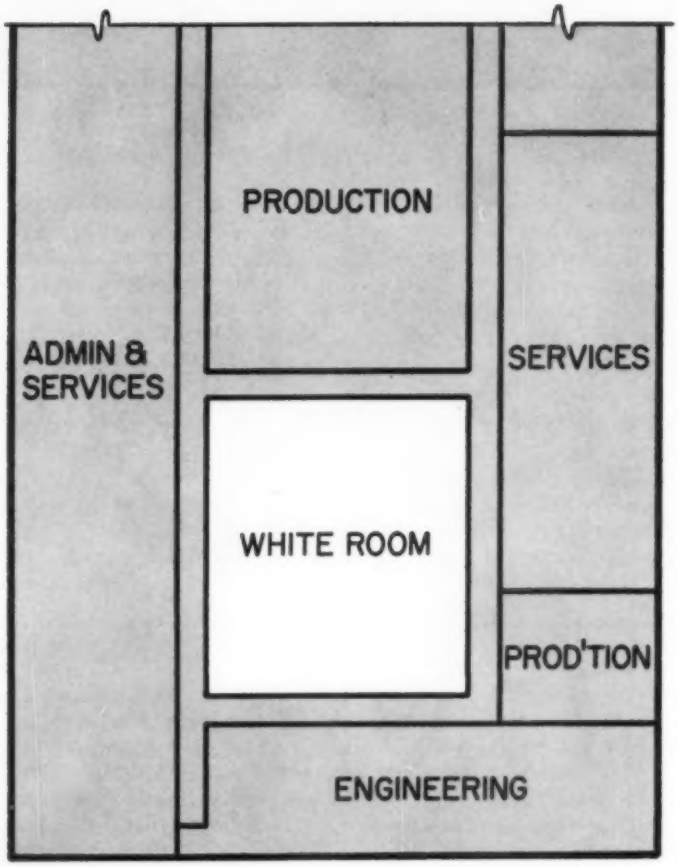
These outline specifications and cost estimates were based on:

1. The building construction, including foundations, concrete and steel members, walls, etc.
2. Site development including grading, drainage roads, parking lots, railroad siding, landscaping, fences and waste lagoon
3. Mechanical services that are an integral part of the buildings, such as air conditioning, plumbing, heating, including boiler plant equipment, ventilation, sanitary sewers, process sewers, storm sewers, incoming water service, incoming gas service, yard storage tanks
4. Electrical work that is an integral part of the buildings, such as power distribution, lighting, grounding, motors, starters and controls for mechanical services
5. Miscellaneous electrical work such as telephone conduit and wiring, conduit for intercommunication systems and watchman's service
6. Material handling equipment such as the bridge crane and cotton handling conveyors in the bleachery and piping for vacuum stripping systems
7. Fire protection systems, including automatic sprinklers and alarms, yard mains, hydrants, hose houses, suction tank and fire pump
8. Piping and electrical service from tank farm, incoming utilities and building services to process equipment
9. A complete tabulation of all production machinery and equipment required

The preliminary design, specifications and cost estimate were itemized and described in such detail, that the working drawings and specifications presented no difficulty in their preparation. They included all design criteria required by Parke-Davis. All equipment layouts, departmental areas, wall construction, building equipment, lighting, power, utilities, etc. were firmed up during the preliminary design stage so that a *realistic* cost estimate could be obtained.

It is apparent that the method used in requiring detailed preliminary design and engineering eliminates inefficiencies resulting from jumping into working drawings without the complete project concept. Very few major questions had to be resolved at this stage. A scale model was constructed to provide management with a visual aid to evaluate the scope and appearance of the building surroundings.

It is this detailed preliminary work, the major share handled by the engineering department, that has definitely smoothed the path between inception and completion of the project. **End**



Focal point of plant designed for production of miniaturized products is white room, or clean room. Author describes many of problems associated with designing and keeping a clean room "clean."

FACILITY DESIGN

—For Miniaturized Products

By **CHARLES PARKER**, Manager of Facilities Planning, Miniature Precision Bearings, Inc., Keene, N.H.

FREQUENTLY, when a firm makes its decision to enter the field of miniaturized components, or finds itself thrust into the field because its product is diminishing in size, facilities planning begins in earnest only after its well-engineered product runs into serious trouble or fails completely. Then the facilities planner usually finds himself in one of two positions. Either he is faced with the problem of up-dating an existing facility or he is commissioned by management to plan a completely new building. In either case he will soon discover that the cost of accommodating a plant to a miniaturized product is high, varying from $15.00 to $100.00 a square foot, and he will come face to face with such complex problems as: how much air conditioning will be needed? filtering equipment? footcandles of light? shoe cleaners? air showers?

There are several approaches to the problem. One—review the parts prints or product specifications from the point of view of tolerances, materials, and process. Plant engineers, planners, and architects sometimes feel that this approach may involve too much detail, but some examples of how this works out in practice would correct this mistaken notion. Take a print with dimensions of the order of 2/10,000 or 50 millionths. It can readily be seen how a 5-micron dirt particle could become a major stumbling block or impediment to a moving part. Here is the first and probably best clue to the facilities needed, since control of dirt has a bearing on nearly everything

This article excerpted from the author's chapter in "Miniaturization" to be published by Reinhold Publishing Co.

from the selection of building materials to the elaborate de-linting installations for employees' clothing.

Specifications for material may require that the material be protected from the corrosive perspiration of an employee's hand or, as in the case of beryllium, that the operator be protected from the material. In either case there is a long list of facilities affected, ranging from ventilation equipment to boiler capacity.

The second approach available to the planner is the use of historical evidence of problems accumulated by such departments as methods, processing, maintenance, manufacturing, and gaging as they relate to building design and services. The record of a methods or processing group may point to problems of water contamination in manufacturing. Maintenance may have a record of continual calls by a gage service group for water or dirt in the air lines. The maintenance group may have noted the tracking of dirt and contamination from a production area to a much-used hallway servicing a critically clean area.

Manufacturing may have a history of tooling crack-ups, the result of inadequate air supply. This may be caused either by filter problems or by a difference in operating speed of high-frequency wheel heads due to hysteresis or a power drop resulting from over-extension of the lines which accommodate expanded facilities. The gaging for 1/10,000 tolerances may require light levels at previously unheard of footcandles for a machine-shop operation.

Bearing in mind that each approach is an attempt to arrive at the optimum facility for housing the manufacture of a miniature product at a cost consistent with the product design, a third approach is possible in which all the facilities servicing a particular segment of the process or manufacturing operations are listed. This is to guarantee that all the plant services required by a particular segment of the process are commensurate with the degree of control required to maintain the status of the operation. It would be extremely short-sighted to do a tremendously expert job on the compressed air supply of a critically clean area and then overlook the many minute controls necessary to prevent the entry of dust and dirt on the shoes and clothing of the workers.

The wide range of materials available for the construction of clean areas is a significant factor in the final cost figure per square foot. Consider, for example, two materials selected for wall covering and found at opposite ends of a price scale. On the one hand are the relatively inexpensive plastic-coated fabrics; on the other, the exotic stainless steel finishes. The selection of stainless steel for a wall covering demands the same degree of consideration as for other construction materials, including equipment related to the control of employees, materials used for jigs and fixtures, and the piping, duct work, and material used for services. In other words, it is only logical to find air-conditioning duct work fabricated of materials comparable to the materials used for jigs, fixtures, and storage cabinets, as well as de-linting chambers, shoe cleaners, and other employee control facilities.

This is not to say that the only means of controlling dirt is through the standardization of material throughout the entire dirt-free facility. It does mean, however, that this approach deserves serious consideration. There have been a few such installations. Now when one hears of such facilities costing $100.00 per square foot, it seems more plausible.

Because the facilities planner is concerned with preventing trouble before it starts, dust and dirt control should begin at the main gate of the plant. These controls must be translated into comprehensible terms for

Fig. 1. In manufacture of precision assemblies such as these bearings and universal joint, dust is "poison."

Fig. 2. Hooding greatly reduces area in which contamination can occur, cuts dust-carrying worker movement.

Fig. 3. Shoeshine machines are used by women workers to clean their shoes before entering assembly clean area.

Fig. 4. In separate dressing area, employees don hair-confining hats, put lint-free smocks over street clothes, walk on gelatinous floor mat to remove dust from shoes.

FACILITY DESIGN . . .

employees, since efficiency depends in large measure on their conscientiousness and cooperation.

Appreciation of the need for cleanliness assures maximum utilization of planned facilities. For instance, it is important for critically clean areas that sand and salt from parking lots not be tracked into the building during the winter months.

Floor coverings inside the entire plant are also of great importance. Not only must they withstand abrasion which could form a contaminant, they must also withstand heavy machine loads and meet the standards of the Safety Department.

The foregoing are general considerations given to general areas. More critical consideration must be given to critical areas. In general areas, fibers may range in size to 100 microns or more; this would be intolerable in a critical area. Even though control of general areas aids control of critical areas, the difference in minimum standards between the two is enormous. A typical dirt count for a critical area might be a particle size range from 5 to 65 microns, with 200 net particles allowed per cubic foot of air.

To control dust and airborne contamination in this range, analysis of clothing, shoe cleaners, de-linting devices, vacuum systems, and clothing storage areas must be just as thorough as it was for the compressed air supply, the air conditioning, and other facilities of the plant.

Probably the greatest source of airborne contamination is clothing. Dust and other foreign matter are circulated through the air by the movements of the people in a critical area. This has become such a well-established fact that manufacturers of miniaturized products have established a minimum number of square feet per employee.

Three approaches reduce the problem of airborne contamination from clothing. One is to clothe the employee from the skin out with garments supplied by the manufacturer. A second approach is to supply garments as nearly lint-free as possible to be worn over street clothing. These garments act as traps to prevent dust and contamination from escaping into the atmosphere. A third technique involves the use of hoods which are set up over the operations performed; air is supplied through a filter to create a positive pressure inside.

The hooding technique is used in conjunction with either one of the aforementioned clothing procedures and with such devices as vacuum shoe cleaners, tacky mats, de-linting chambers, vacuum blowoffs, and deionized air. To date, it is impossible to single out, on the basis of scientific evidence, the one best technique for controlling dirt and airborne dust in every set of circumstances, however the hood approach has much to recommend it.

The first and most important factor is the size of the area being controlled. Assembling a miniaturized product under a hood greatly reduces the area about which the facilities planner must be concerned. The smaller the area the more effective the control. Also, this approach eliminates almost completely the greatest single source of contamination—movement of the workers themselves.

Most important in making all facilities more effective, though not the direct responsibility of the facilities planner, is the employee's awareness of the need for dirt control. This awareness should be developed by means of carefully planned training programs. In this sense, proper employee attitude is the responsibility of the facilities planner since pride in workmanship is essential to the successful manufacture of miniaturized products. **End**

Fig. 1. These two 400-ton Carrier units now provide chilled water for air conditioning. Note that space for a third unit exists in background.

A Building All Ready To Grow . . . DESIGN FOR EXPANSION

By T. R. SODERBERG, Asst. Director, Corporate Plant Engineering
The Garrett Corporation

UNUSUAL PROVISIONS for rapid and convenient plant expansion, and a "core floor" sandwiched between the first and second floors to simplify service and utility installations and maintenance, are major features of the new plant segment completed recently by Garrett Corporation's AiResearch Facility, Torrance, California.

"Plant segment" is the proper term to use, for this new 70,000-sq ft building is but a portion of a planned 216,000-sq ft plant and the first of several which will eventually be erected on a 70-acre plant site just south of Los Angeles. The master plan developed by the Garrett Corporation Plant Engineering Department shows that when completed, the new plant will encompass about one million sq ft under roof, with provisions for 5000 daytime and 2000 swing shift employees.

This master plan is the key to the provisions for rapid and convenient plant expansion. It includes, down to the last detail, just what will be required in all areas for the finished plant. Thus when one building, or any portion of a building is constructed, integral service and utility specifications for that building, or portion thereof, are the same as if the entire plant were being built at that specific time.

In this first plant component (or building), footings were poured along exterior walls, where additions are called for in the master plan. All service and utility lines, ducts, piping, conduit, etc., are the same capacity as they will be when the plant is completed. These lines and runs are capped at their terminations, but are spaced and ready for immediate extension as other plant components are added.

As an example of this preparation for plant expansion, the master plan calls for 2000 telephones in the finished plant. The building segment already completed will contain the main telephone switchboard. Therefore the telephone conduit installed in the new building is of sufficient capacity to carry 2000 lines, despite the fact that it is only partially filled at this time.

The telephone equipment currently required is only a small portion of what will be eventually needed, and is housed in a small room with a dry-

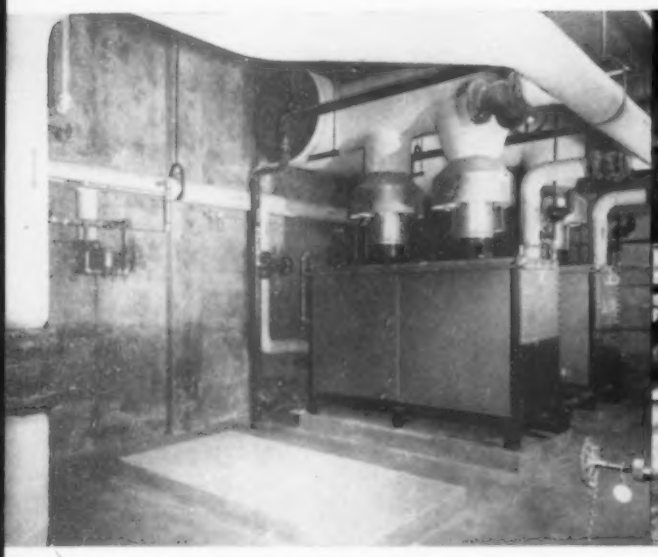


Fig. 2. Two boilers provide heat for the present building segment. Provisions for a third boiler have been made.

Fig. 3. The "core" area between the first and second floors adds convenience to utility, service installations.

wall knockout. Currently, space beyond the dry wall is being used for other purposes. But, when this space is needed for telephone switching equipment the dry-wall knockout can be quickly removed.

This new plant is using a lot of space for other than its eventually intended purpose. But in all cases this currently "misused" space includes all structural facilities required for its ultimate purpose. Thus several rooms or areas now being used for production, inspection, or other purposes, will serve as toilet and washroom facilities when the plant is completed. Each of these rooms contains carefully planned knockouts for the installation of fixtures, as well as convenient sewer connections, so that a minimum of reconversion work will be required when expansion occurs.

Service Lines Are Accessible

From the maintenance standpoint, a great advantage results from the fact that all of these service and utility lines and ducts are installed in the open. They are easy to reach for inspection, servicing, additions, extensions, or for removal. This open installation is also less costly, since appearance or concealment is not a factor.

When the plant is finished, it will contain a 14-ft-wide unobstructed hallway aisle (all telephones, time card racks and clocks, outswinging doors, refreshment machines, etc., are recessed) running the full length of the first floor, and a 14-ft-wide and 16-ft-deep tunnel running nearly full plant length and paralleling the basement areas. The first segments of these convenient passageways are installed in the new building and are ready for lengthening when needed. The portion of tunnel already installed extends beyond the building area, where it is equipped with a full-width top opening covered by segmented reinforced concrete slabs. When it becomes necessary to move a heavy piece of equipment into the basement area, a crane is used to remove the slabs and lower the equipment into the tunnel.

The plant air conditioning equipment now installed in the basement area will require additions as the plant expands, and eventually will have to be interconnected with similar equipment located in basement areas yet to be constructed. Provisions for the additions and for eventual interconnection were installed at the time this first was erected. The basement area already contains two 400-ton Carrier chilled water units. Space is provided for a third unit to be added later. The master plan calls for three more units to be installed in a basement area not yet in existence.

Two boilers now furnish the heat for the heating and air conditioning system. The base for a third boiler is already in, along with all the necessary plumbing and valves. Interconnection of these units with other units in another basement area will be made through lines and ducts already partially installed and terminated at the new building's current boundary.

Separate, but "Joinable"

In graphic analysis, and insofar as plant expansion provisions are concerned, this new plant segment can be compared to an uninstalled automobile engine. It can be operated by itself (just like the uninstalled auto engine can be operated on a test stand) but contains all the provisions for making it a part of the completed plant.

Another feature of this new plant building segment is the "core floor" area. It's literally a plant engineer's dream come true. The core floor is the same size (70,000-sq ft) as the rest of the building. A major portion of all plant maintenance work will be accomplished here without interfer-

ence to or from production or office personnel. All maintenance offices and shops are located on this floor. Space provided by the core floor greatly simplifies, lessens the cost, and speeds the work on new service or utility installations, or on utility service changes and alterations.

The core floor is located "in the floor" between the first and second floors of the building. This was made possible by using room-height trussed girders. The depth of these girders provides room for the core space between the first and second story. As no production work of any type is carried on in this area, and because it is limited to service, utility, and maintenance functions, it does not constitute a legal third floor.

From a cost standpoint, pre-construction estimates by plant engineering showed that a two-story building with a core floor would cost less than a single-story building spread over twice the area, or a two-story building minus the core floor. Savings in the latter case accrued from avoiding conventional service and utility installations, and the avoidance of having to provide maintenance office and shop space on a production floor. In addition to these advantages, savings over single-story building construction included the land area involved.

The advantages of the core floor area can be easily recognized by envisioning it in its initial state—as open and unused space between the production floors above and below it. This space is available for running any required ducts, power lines, piping, conduit installations, and in some cases (as with telephones) open wiring, to a point directly above or below the spot where they are required on the production floors. Such installations can take "the shortest distance between two points." This greatly minimizes footage requirements. After a run has been led to a certain spot on the core floor, it is only necessary to drill through the first floor ceiling or the second story floor, and lead the lines directly up or down. Even the necessity of drilling is eliminated in many cases because during building construction, four knockouts, leading down and up, were installed at each column.

Services Are Preplanned

This does not mean, however, that lines and ducts are run haphazardly. Definite installation patterns were carefully preplanned. All duct installations are suspended 18 in. from the core room ceiling. This leaves room for pipe and conduit runs above the ducts. The location of telephone service panels, power distribution panels, etc., were located to minimize lead length requirements. Specifically, the layouts of all the utility and service lines and duct installations were preplanned with an eye to over-all footage saving rather than footage saving on a specific run.

This core space serves a secondary purpose, in that it provides cube for extending the ceiling height upward over specific first floor areas—one first floor stock room, with a 20-ft ceiling, extends through to the core room ceiling. The same applies to the laboratory, where additional height was required for a manometer installation.

In over-all perspective, the core not only provides maintenance space entirely apart from the production area, but serves as well to isolate most maintenance work from production and office areas. This minimizes interference problems. When a new machine is installed, maintenance work in the production area is limited to setting and connecting the machine. All services to the equipment are run through the core area. When telephone trouble occurs, all checks and tests may be made from the telephone service panel in the core area.

This new AiResearch plant is being scaled to space age production requirements. In this type of work, the established, long term production line is virtually obsolete; only a few of each product are manufactured. After one of these relatively short production runs, many plant changes must be made for the next product, yet, each and every one of these production facility changes must maintain tolerances hitherto rarely encountered in industrial production work.

The ability to expand plant facilities as needed, with minimum inconvenience and cost, utilizing the core floor, greatly simplifies plant changes. This plant is literally "ready to grow." **End**

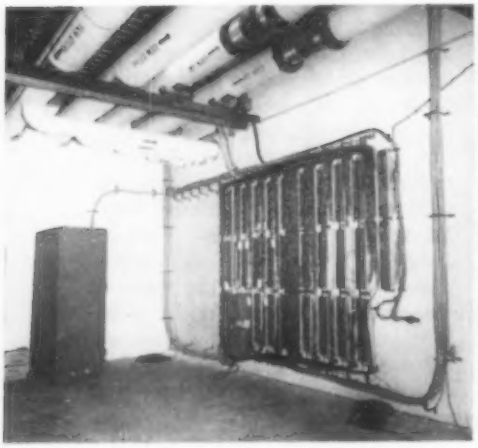


Fig. 4, left: Pipe installation in progress. Floor is drilled so pipes can be connected to equipment on floor below.

Fig. 5, far left: Location of telephone wiring panel in the "core" area provides ultimate in service convenience.

BUILDING COMPLETION Within a Limited Budget, Ahead of a Tight Schedule, WITH MODULAR DESIGN, GOOD PLANNING, TEAMWORK

Fig. 1. Entrance to 75,000-sq ft Pershing Hall, built within 90-day construction schedule. Modular construction, precast structurals cut time, cost.

By **JOHN J. NOVOTNY**, Plant Engineer, The Martin Co., Orlando, Fla.

LESS THAN three years ago, the Martin Company opened its new $18,500,000 missile and electronic center at Orlando. Early in 1960, increased activities produced a need for additional space to accommodate Pershing Missile Project personnel.

To fill the space requirements, a decision was made to create a new structure without altering any of the existing buildings. Management set a budget goal of $8.50 a square foot for the complete in-place cost of the new building. Construction time was established as 90 days after the award of the construction contract. The construction schedule, design criteria, lighting, air conditioning, aesthetic treatment, etc., were Plant Engineering decisions.

Schedule, Cost Limits Set

The specifications submitted to the architectural firm of Connell, Pierce, Garland, and Friedman—designers of the original Orlando plant—stated these schedule and cost limitations. Also, the lighting intensity, the acoustical treatment, the requirements for complete air conditioning and heating, along with the necessity for security and easy access to existing parking lots, and the requirement that the architectural treatment be in keeping with the beauty of the original Main Plant were incorporated. Unusual speed in design and construction period was established as part of the division's rearrangement plan. Relocation of equipment and personnel was scheduled for the two-week period when the plant closed for summer vacation.

The architects reviewed Martin's

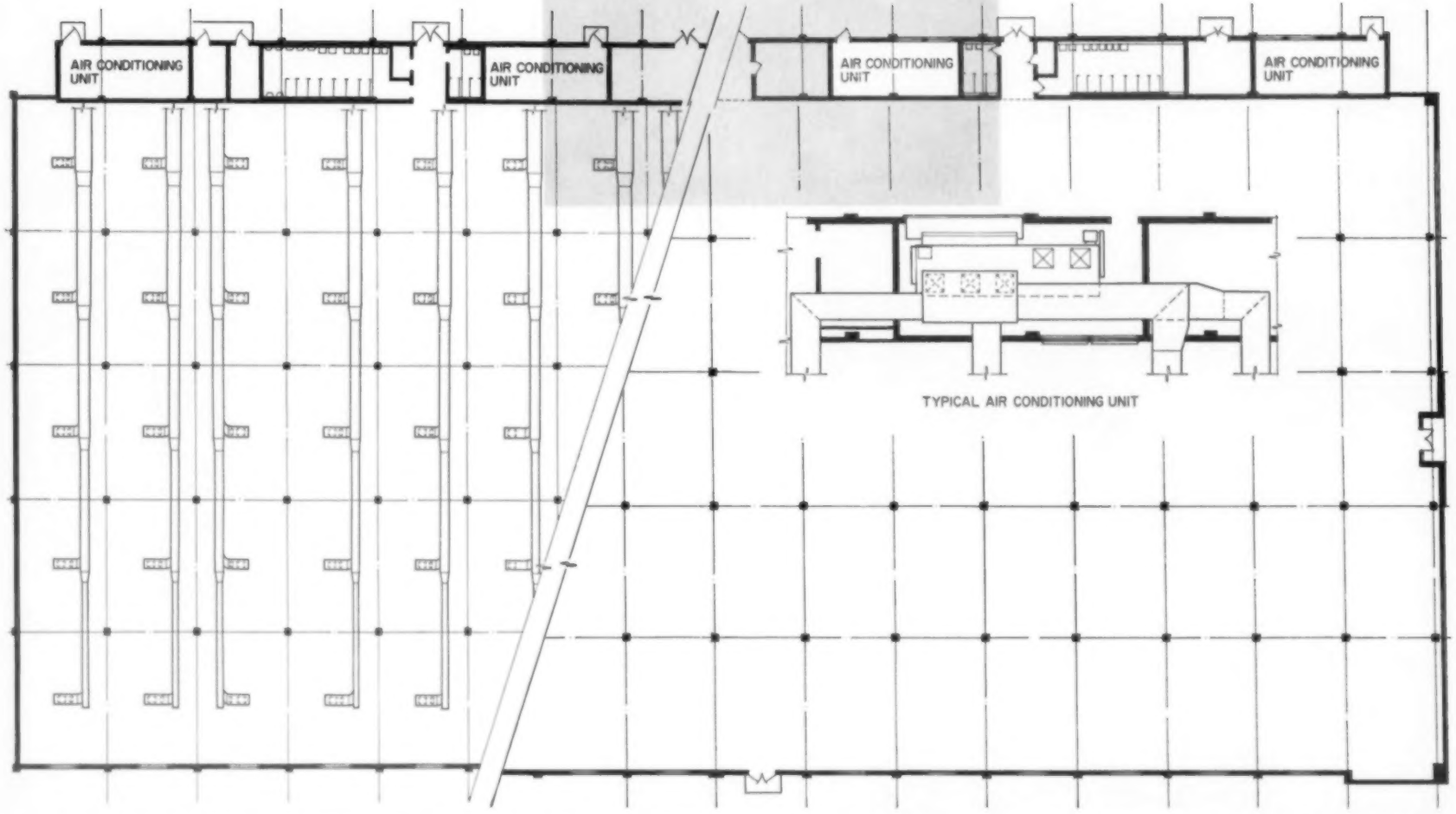
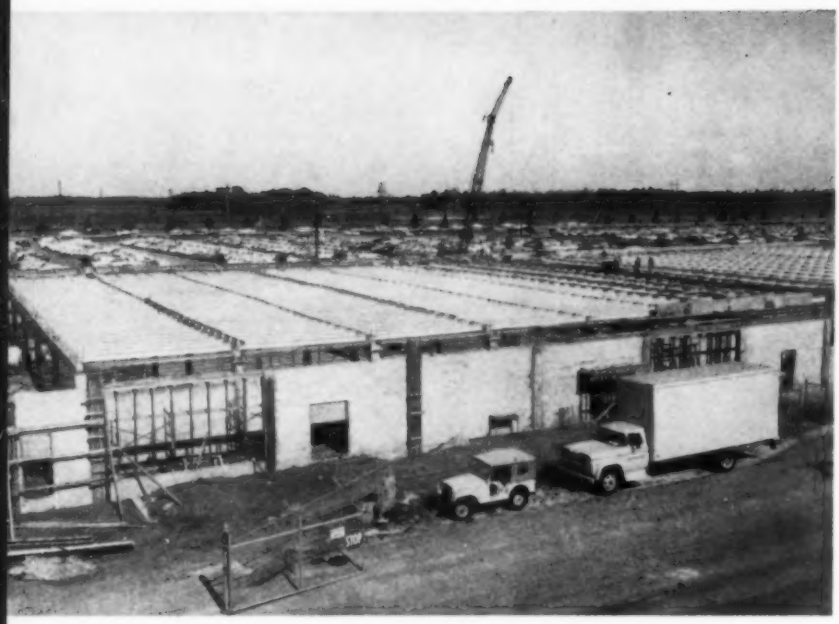


Fig. 2. Floor plan of building illustrates how modular construction was used. Air conditioning equipment rooms, employee entrances and service rooms, offices, electrical equipment rooms, janitors' rooms are all located in service building, separate from main area. Isolation of these non-productive areas improved layout and increased flexibility. Inset of typical air conditioning unit shows that duct-work was also standardized. Each "package" conditioning unit serves four ducts.

Fig. 3. Various stages of construction. Wall in foreground encloses employee facilities area, air conditioning units, other services.



BUILDING COMPLETION

design criteria, and within 24 hours, the preliminary drawings of the 75,000-sq ft structure were ready for the first review by Martin personnel.

The design speed was not materially influenced by the fact that the same architect had designed the main plant building—the design concept was new and had no bearing on the established and in-place buildings.

Modular Design Paid Dividends

The Pershing Project Building was designed on a modular basis for the purpose of speed and efficiency in construction; at the same time, these modules established the column pattern that gave maximum utilization in floor plan layout. Each bay, 25 ft by 30 ft, of the building was designed to be identical to the adjoining bays; this simplified the design and gave the contractor an opportunity to handle his construction on a basis that allowed maximum use of framing, concrete forms and other required falsework. Precast trusses, poured gypsum roof, poured concrete columns and floor covered with vinyl tile were the main construction materials.

The roof beams were set 3 in. higher than actually required for a structure of this type; the additional height allowed the ready-mix concrete trucks to drive inside the structure and pour the concrete floor after the roof framing was underway. This ultimately effected a savings in both time and labor for the contractor and reflected a dollar savings to the owner.

The design specifications and the construction philosophy of the Martin Company required that the architects and engineers produce a maximum net usable office area within a structure that would contain a minimum amount of lost space dedicated to the services and utilities for the new building. To achieve this goal, service areas were established in a 12-ft-wide structure along the west side of the building, which housed toilet rooms, air conditioning transformers, communications office, and janitor's storage, in space that was constructed at a lower cost than the main office building.

The building is air conditioned with six package-type units, all of the same size, with duct work of identical runs. This, once again, lowered costs by following the concept of repetitive installation for bay after bay. Likewise, the electrical, mechanical, plumbing, and roof plans were all designed to be constructed in this repetitive manner.

A project engineer was assigned to the job by the A/E Firm. This representative handled the field problems with the contractor and the subcontractors and channeled the other problems of procurement, financing, etc., to the proper representatives within the Martin Company.

Approximately three weeks before the original schedule date for occupancy, some 6000 pieces of office equipment were moved into place for the Martin technicians and office personnel to be located in the Pershing Project Building.

The construction of this high quality building within a limited budget and within a close schedule date was due to the close coordination and teamwork of Martin personnel with A/E and contractor and subcontractors.

Praise from Management

Mr. G. T. Willey, Vice President and General Manager of the Martin Company in Orlando, stated, "The completion of this building several weeks ahead of schedule reflected efficiency made possible by the blending of the highest professional skills inside the Martin Company's Plant Engineering and Procurement Departments, along with the architect/engineer, prime contractor, and subcontractors that participated in the construction."

The Plant Engineering portion of this job was handled under the direction of the author, and Mr. R. T. Leitner, Chief of Plant Design and Layout. The procurement aspects of the program were handled under the direction of Mr. W. H. Snyder, Manager of Facilities and Indirect Procurement. **End**

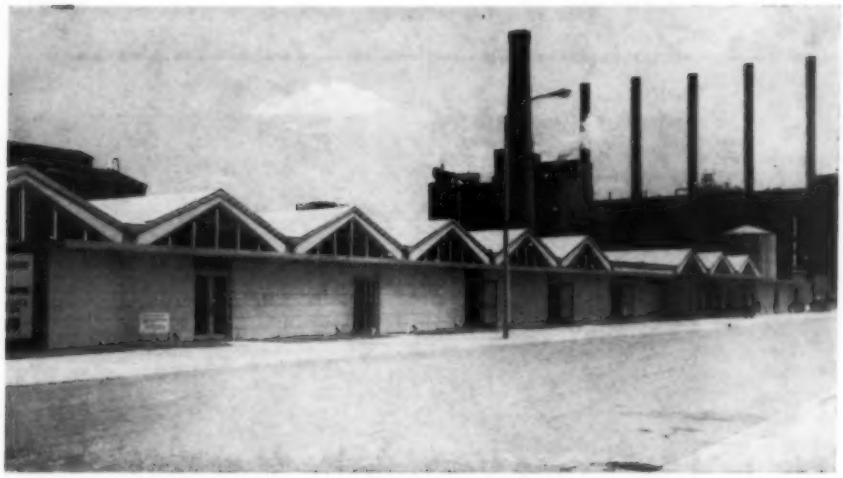


Fig. 1. Gables in service building are glazed for natural lighting; side walls of lobby entrance are translucent plastic sandwich. Fig. 2, layout of building shows central service unit, flanked on both sides by locker room.

PRESTRESSED CONCRETE

Columns, Beams, Slabs Form Plant Service Buildings

By **STANLEY PEEL**, Monsanto Chemical Co., W.G. Krummrich Plant, Monsanto, Ill.

IMPORTANT PARTS of an extensive modernization program, two new employee facilities—an auditorium and a service building—are now in use at Monsanto's Wm. G. Krummrich plant in Monsanto, Ill.

Both structures make extensive use of precast, prestressed concrete. Precast double tee slabs form the roof of each building. In one, they rest on curved, precast beams; in the other, they rest on Y-shaped precast beams which form a sawtoothed roof line. Vertical columns in both buildings are precast and prestressed, and pre-

cast concrete piles were used in the foundation systems.

The service building, which is 94 ft wide and 336 ft long, contains nine locker room units, laid out in repetitive modules, and one service building unit. The structure houses locker and shower facilities for 2142 employees, and can be expanded to permit the addition of two more locker room modules.

Each locker room unit, 32 ft wide and 94 ft long, contains locker, shower and toilet facilities for 238 people. Each of the individual lockers is divided into separate compartments for street clothes and work clothes. The building ventilation system is designed to exhaust air down through each locker, into ducts in the radiantly-heated floor, then out through ventilators in the roof. The shower and toilet facilities have tile floors and ceramic tile walls, as shown in Fig. 4.

Fig. 3, top. Interior of locker room. Horizontal beams hold tee slabs in roof; light fixtures fit into slabs; locker bases contain exhaust ducts.

Fig. 4, bottom. Ceramic-tiled shower rooms contain stainless steel shower pedestals; each pedestal has five individually-controlled showers.

Central Handling Area

The service center unit is 48 ft wide and 94 ft long. It accommodates handling, sterilizing, and drying facilities for employee clothing and safety equipment, as well as office, storage and heating and ventilating equipment. Special individual clothing dispensing lockers are located in the entry corridor; employees pick up company-furnished clothing from these lockers.

Exterior, non-load-bearing walls in the building are backed with four-inch-thick concrete block. Interior concrete surfaces—ceilings and columns—are painted. All piping and ducts are concealed in the walls or floors; lighting fixtures are recessed in the ceiling tees.

The auditorium, or assembly building, features recessed wall panels, in a combination of red brick and yellow glazed tile, which present a striking appearance, against the plant background—chemical tanks, towers and production buildings. The roof is finished with white marble chips over its built-up roofing membrane.

This 68-ft by 150-ft building is divided into seven areas: a 54-ft by 102-ft assembly room; a 16-ft by 40-ft stage; a lobby; two restrooms; a coatroom; and a storage room. The building is completely air conditioned and includes modern lighting and acoustical treatment.

Its assembly area will seat 750 people. Folding chairs are used, so they can be stored (under the stage) to provide a 5400-sq ft open floor area when needed for employees' recreational use.

Longest span of precast double tee roof slabs in the service building is 32 ft, while those in the assembly building span 54 ft, with a six-foot overhang on either side of the building.

Roofs of both buildings are composed of a vapor barrier over the tee slabs, a one-inch layer of insulation board, and four-ply built-up roofing surfaced with white marble chips. Exterior metal gutters and roof trim are of stainless steel.

Project engineer on the job was Monsanto's A. F. Skoglund, K. E. Wischmeyer was the architect, and Wm. H. and Nelson Cunliffe Co., Inc. handled the engineering design and general contracting. **End**

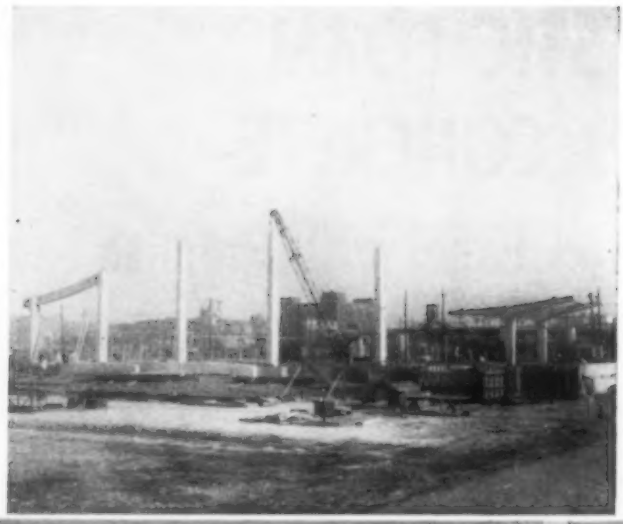


Fig. 5, left. Early construction stage of auditorium. Precast roof beam is set on columns to form roof line. Precast T will hold entry canopy.

Fig. 6, below. Completed auditorium. Dark vertical lines are precast concrete columns. Low sloping roof at left covers lobby, coatroom areas.

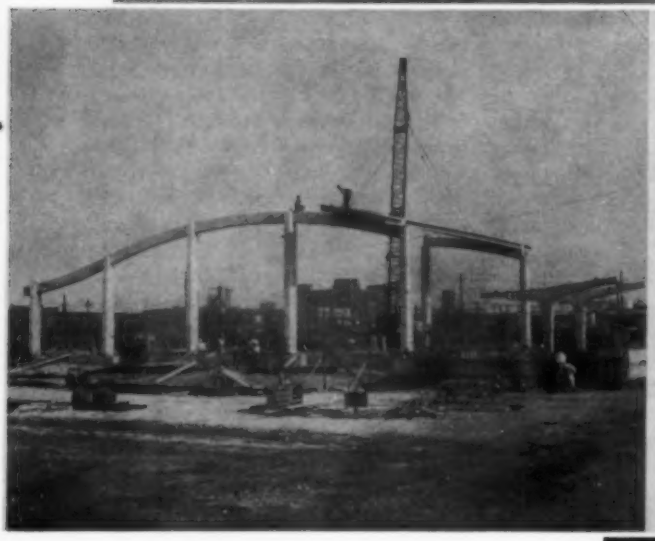
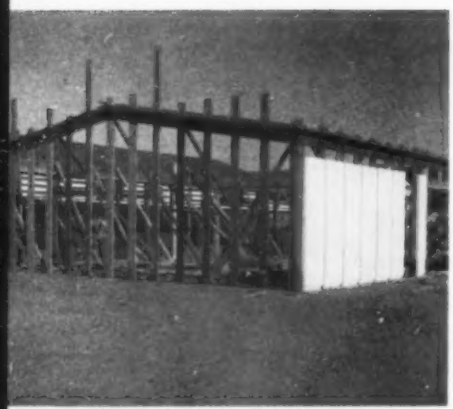


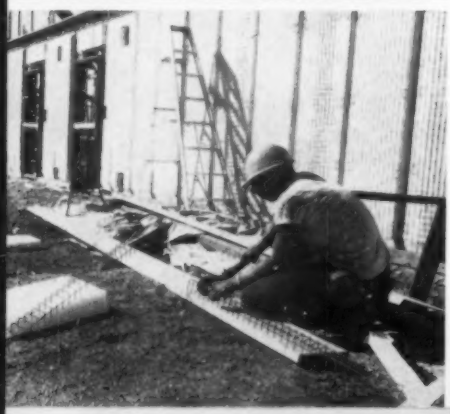
Fig. 7, above. With one set of curved roof beams in place, precast concrete double tee roof slabs are laid down to span full width of the building.

Fig. 8, right. Interior of completed auditorium shows broad expanse of column-free area. Lighting, acoustical baffles form "steps" under roof.

PLASTIC FOAM AND CONCRETE—

A Wall Panel with Promise





AN UNUSUAL version of a tilt-up wall has been designed to produce new economy in construction, heating, cooling and maintenance of industrial buildings and plants.

The construction innovation is based on the Insulrib Method, a patented system developed by Golden, Bryant & Jehle, an El Centro, California, architectural and engineering firm.

The basic concept of Insulrib is an ultra-thin, highly insulated, ribbed bearing wall. Slabs of Styrofoam, a plastic foam insulating material of the Dow Chemical Company, are combined with concrete or gunite—which forms structural ribs between the slabs and a tough exterior skin for the building.

The resulting wall, which for a single-story building is usually 6½ in. thick, including the interior plaster finish, has about one-seventh of the heat conductance of an 8-in. pumice block wall, and weighs only about 35 pounds per square foot.

Two basic variations of the wall are the guniting method and the tilt-up method. In the guniting version, the wall construction includes the erection of temporary wooden "picket fence" forms vertically, and toe-nailing slabs of polystyrene foam to the vertical pickets, leaving four-inch spaces between adjacent slabs of foam, for ribs. Steel rods are then set in the ribs, and this is followed by: applying reinforcing mesh; reinforcing the window and door openings; guniting the exterior walls; removing the wood forms; and plaster-

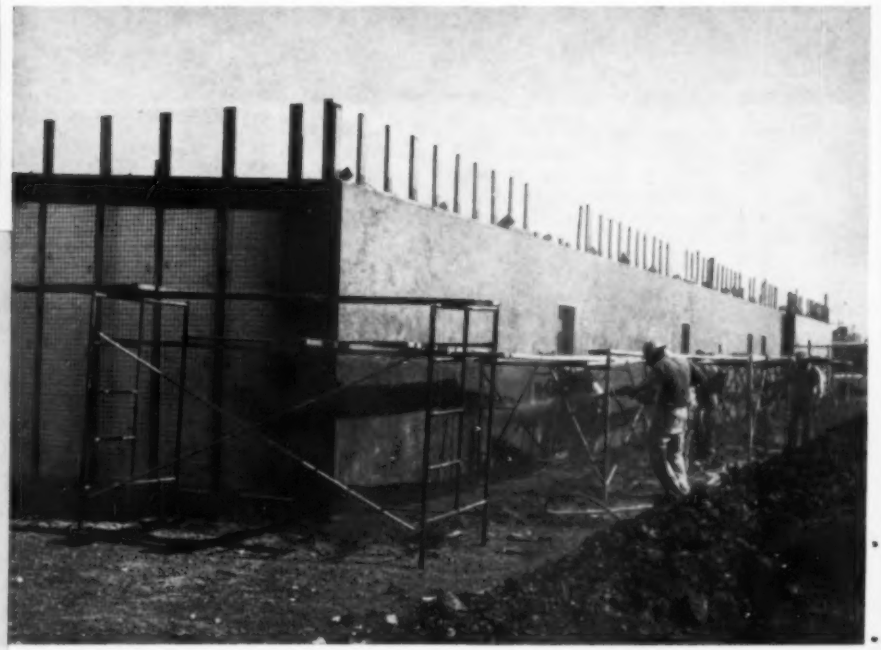


Fig. 1, top. First step in producing gunited wall is placing of foam panels against temporary forms.

Fig. 2, above. Next, wire mesh reinforcing is secured to slab faces and in four-inch rib spaces.

Fig. 3, right. Third step is spraying of gunite concrete over foam to produce exterior wall facing.

Fig. 4, left. Electrical, plumbing chases are cut into foam with heated wire loop on soldering gun.

Fig. 5, below. Tilt-up panel with foam core, concrete ribs, will look like these initial test panels.

ing the interior walls, ready for paint.

For industrial, single-story plant construction, the firm advocates the use of the tilt-up version. They point out that the ordinary tilt-up wall has some disadvantages which are overcome in the new version.

In the first place, the conventional tilt-up wall must be reinforced for pickup unless special lifting equipment is used. The total dead weight of the wall acts in beam fashion so that a solid six-inch wall weighs 75 pounds per square foot. However, once the wall is erected, much less strength is necessary to resist the wind loads. This means that some of the reinforcement in the wall section is actually used only during the moment of pickup.

On the other hand, if special reinforcement is not used, vacuum lifting mats or other special pickup devices become necessary—which means considerable additional cost. If the foam core wall is used, however, the producer states that the lightness and high structural strength of the foam-cored wall preclude additional reinforcement.

Construction of a tilt-up plastic-concrete wall panel is much the same as that of the conventional tilt-up wall panel.

The building floor slab is used for a casting platform, and the exterior forms which outline the individual wall panels are erected on the building slab. Within the forms for each wall panel, planks of plastic foam in four-inch thicknesses are laid out side by side with a four-inch space between the adjacent planks to form the rib space.

A single reinforcing bar is centered in each rib space and supported in the center of the wall thickness by stiff wires which are inserted in the planks of foam. Reinforcing bars are also set at the corners, tops and edges of the walls and around windows and door openings. Welded wire mesh is then laid over the entire face of the wall panel and supported on spacers above the face of the planks of foam, after which concrete is poured over and between the slabs to form a ribbed concrete skin. After approximately 10 days, the wall sections are tilted into place. Since the exposed plastic foam between the ribs can be easily grooved, the plumbing and electrical trades are able to install all their piping and conduit after tilt-up. The interior face of the wall, which consists of exposed foam and the concrete ribs, is then plastered.

On every project in which the new method has been used so far, construction time has been greatly shortened. In addition to the time saved by the plumbing and electrical trades, furring and lathing are eliminated.

Industrial Application Features

According to Golden, Bryant & Jehle, three fundamental features of the method make it applicable to industrial plant construction.

First, a lightweight, load-bearing wall is provided. (A prototype of the wall, a section 8 ft wide and 10 ft high with four typical ribs, was subjected to an axial load of 100,000 lb, combined with a concentrated bending load of 5000 lb at mid-height, without visible distress.)

A second factor is the built-in insulation—a 6-in. wall using foam transmits only one-seventh as much heat as a pumice block wall.

In one large building—the Imperial County Health Center at El Centro, California—refrigeration requirements were reduced by four tons to 28.3 tons in all, and power costs were lowered proportionately.

In fact, the saving on the first cost of the air-conditioning equipment alone in this installation was about $2800, or more than twice the cost of the 12,000 board feet of Styrofoam used in the building.

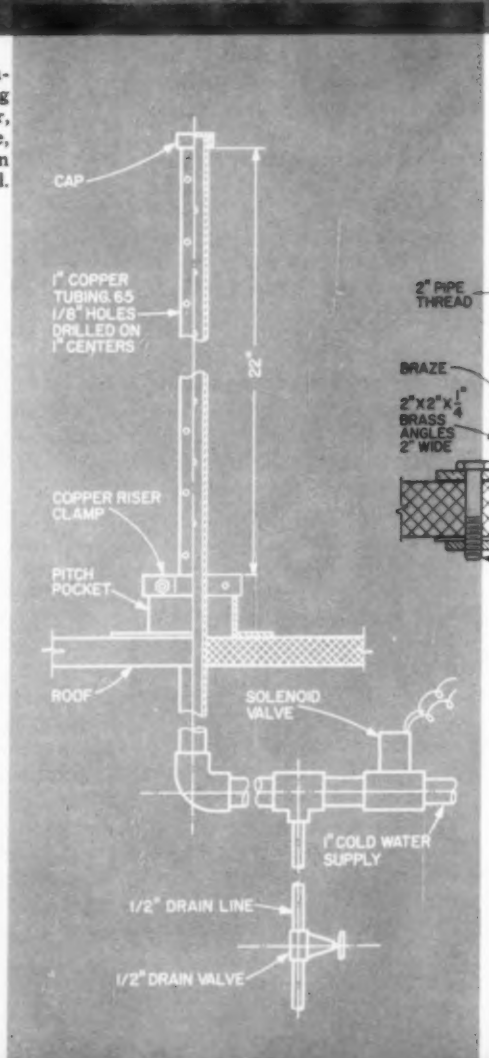
In cold climates, it is recommended that a one-inch-thick strip of foam be used to cover each rib to complete the vapor barrier and prevent condensation. This is easily accomplished by laying a one-inch thick strip of foam between the rib spaces before pouring the concrete tilt-up wall.

The wall also affords some space savings over thicker walls. In the Health Center, for example, 80 sq ft of interior building space were saved by using a 6½-in. foam-core wall rather than an 8-in. pumice block wall.

Incidentally, the cost of the concrete that is displaced by the foam amounts to approximately one-half the cost of the foam. In the case of the gunite version, the cost of the gunite is considerably more than an equal volume of foam.

The plastic foam, combined with gunite or concrete, gives durability and good insulation at a competitive price. Speed of construction and the light weight of the wall are residual benefits that are important to industrial construction. **End**

Fig. 1, above. Three major elements of ponding system. Wave breaker, foreground; spray nozzle, center; level control, in spray in left background.



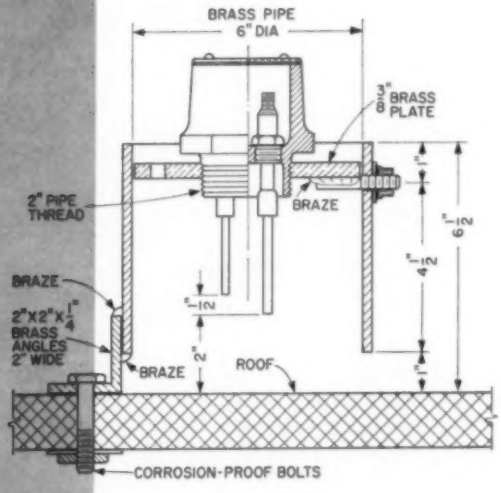


Fig. 2, above. Cross section of level control. Water level is maintained in the half-inch differential between long and short sensing probes in unit.

Fig. 3, left. Spray nozzle construction. Pipe runs through pitch pocket to seal roof opening, is held in position by clamp resting on pocket.

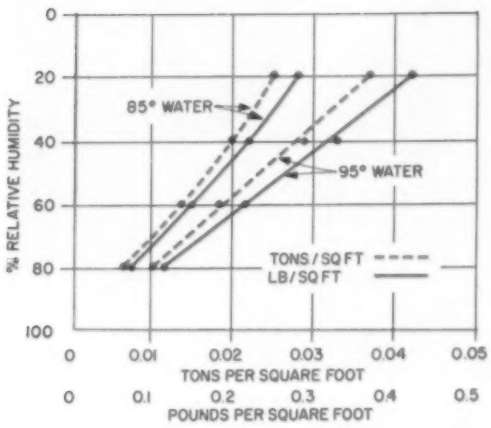


Fig. 4. Graph of relationship of tons of evaporative cooling, pounds of water evaporated, and relative humidity at two different water temperatures.

CONSIDERING A PONDED ROOF?

Here's One That Does The Job . . .

By **JOHN MOLNAR**, Manager—Plant Engineering
Remington Rand Univac, Philadelphia, Pa.

BY DEFINITION, a ponded roof is a roof that is flooded, by intent, with water at a controlled depth.

The new Remington Rand Univac Engineering Center in Philadelphia, with 6½ acres of roof, was ideally suited for the ponded roof. Even though 90 per cent of the entire air conditioned area is directly beneath a roof that is exposed to the sun during hot summer months, we were able to cool these buildings at a rate of 275 sq ft per ton of air conditioning.

Why have a ponded roof?

To reduce the heat transmission through a roof. A layer of water accomplishes this in two ways: a. evaporative cooling; b. added insulation of a blanket of water.

The major contribution of a ponded roof is in evaporative cooling. The cooling action is independent of the water depth and varies directly with the exposed surface, the water temperature, and the relative humidity, temperature and the velocity of the air. This cooling action in tons per square foot is determined by the formula:

$$\frac{(95+(0.425X\ V))\ (Vpw\ -\ Vps)}{12000}$$

where V = Air velocity in feet per minute
Vpw = Vapor pressure of water in inches mercury
Vps = Vapor pressure at saturation in inches mercury

The numerator of the above equation, divided by 1060 will yield the pounds of water evaporated per square foot of area. The results of these two equations are plotted in Fig. 4. For one set 95 F water was assumed; for the other, 85 F water. In our area the average summer wind velocity is nine miles per hour, therefore this valve was used for both sets of curves.

The thermal conductivity of water is high, compared to certain insulating materials. In terms of our roof with two inches of Pyrofill, one inch insulation formboard and a built-up roof, the added insulating value of the layer of water can be considered insignificant.

Is a special roof necessary?

No. A basic requirement is that the roof be flat and level; obviously pitched roofs cannot be used.

The weight of water (maximum density at 4 C) is 62.4 pounds per cubic feet, this is equal to 5.2 pounds per square foot per inch of depth. We control the water level between a minimum of 2 in. and a maximum of 2½ inches, which equals a maximum weight of 13 pounds per square foot.

Since our roof was designed for 30 pounds per square

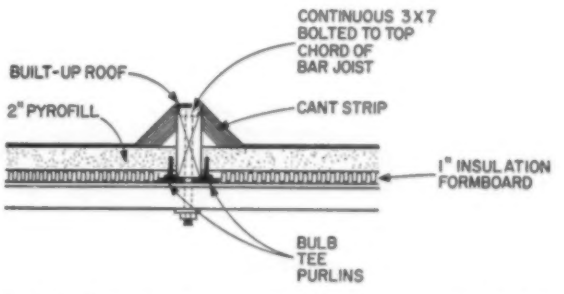


Fig. 5. Wave breaker cross section shows use of timber, set on purlins spanning trusses, as breaker "backbone".

Fig. 6, left. Rain water drain becomes overflow drain, when a pipe nipple is installed to raise drain above roof.

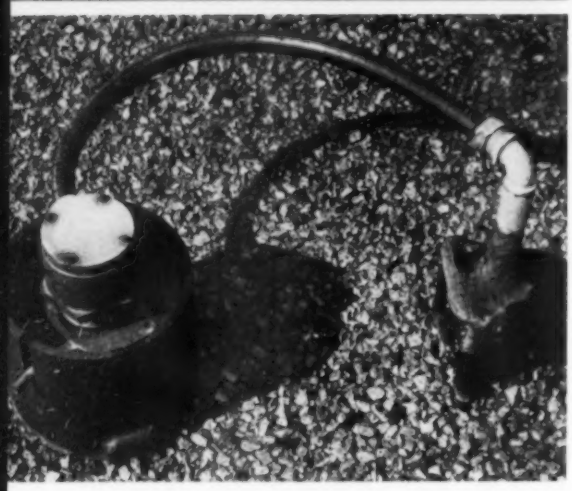


Fig. 7, left. Level control in position in pipe sleeve. Control lead penetrates roof membrane through pitch pocket.

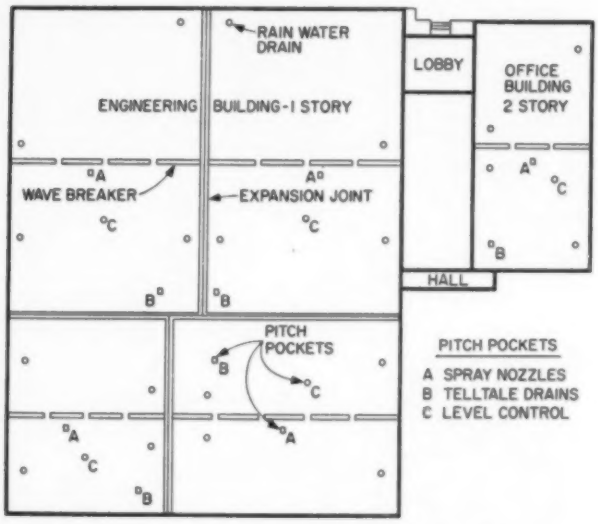


Fig. 8, above. Roof areas in plant and office buildings are divided for ponding by expansion joints, wave breakers.

PONDED ROOF

foot winter snow load, this is more than adequate strength to support the weight of water we use for summer ponding.

Are special considerations necessary?

Yes. Any large unobstructed body of water will permit the formation of waves in even a gentle breeze, with a marked increase in wave size with increased air velocity. In the Philadelphia area the average summer wind velocity is nine miles per hour with peaks three to four times as high. This could create numerous problems on our large roof area (570 ft long by 420 ft wide) therefore special considerations were necessary.

Expansion joints, extending 11 in. above the roof and running the entire length and width of the building, divide this one large area into four smaller ones. These are further reduced by wave breakers built into the roof and extending four inches above it. These wave breakers have a 24-in. gap approximately every 50 ft, to permit free flow of water for minimal level control and spray nozzle installation.

What controls are necessary?

The one-story Engineering Building roof is divided by the expansion joints into four zones and the two-story Administrative Building has one zone. Each of these five zones has:

a. a level control to maintain a minimum of two inches and a maximum of two and one-half inches of water. Low voltage probes sense the level of the water; when the level drops, the solenoid valve is actuated and makeup water begins to flow. A time recorder logs "on" time, cycle time.

b. a spray nozzle which produces gentle spraying of makeup water that will not damage the roof.

c. a tell-tale drain set below the two-inch level with a valve located at a convenient spot within the building. Opening this valve will indicate water on the roof without the climb to check.

d. four overflow drains. The rain water drains are converted to overflow drains for ponding by the insertion of a short nipple with the top one-half inch above the high water level. Overflow drains are necessary so that excess water (from storm or faulty circuit) will run off.

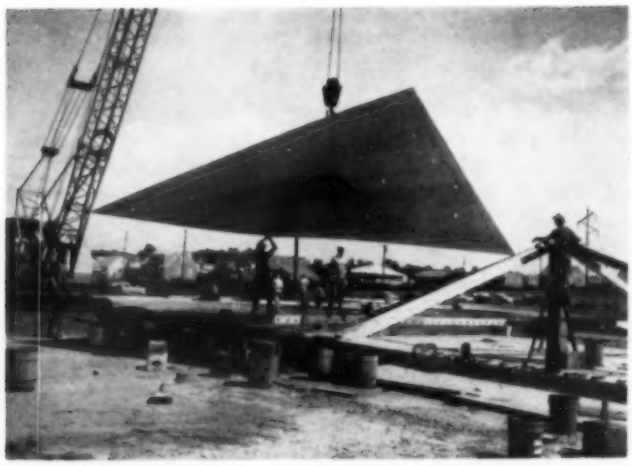
To drain the roof, and for winter operation, these short nipples are removed.

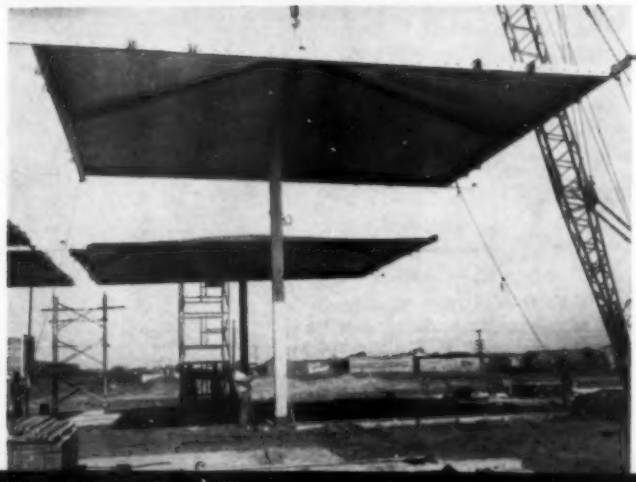
When is a ponded roof practical?

Since the primary function of a ponded roof is to reduce the amount of heat transmission through a roof, it is practical whenever this heat transmission is excessive. It can be used whether or not the building is air conditioned. The application is most practical in the hot, low humidity areas and least practical in the cooler regions.

Another criterion for the practicability of roof ponding is established by the ratio of roof area to air conditioned floor area. (The ratio for our buildings is 90 per cent). There is no sharp line of demarcation, but the higher this ratio the more practical the application. **End**

NEW INDUSTRIAL BUILDINGS from NEW SHAPES IN PLYWOOD





PLYWOOD HYPERBOLIC PARABOLOID

NEW SHAPES and new building techniques possible with fir plywood components are exhibited in a warehouse structure now nearing completion on a 10-acre site near Fridley, Minnesota.

Designed by David J. Griswold and Associates, the warehouse has a shell roof system built with 288 fir plywood hyperbolic paraboloids which were fabricated at a component facility 40 miles away and shipped to the job site by truck. This system permitted reduced site time, with the 125,000-sq ft structure requiring 120 working days to erect. It also kept costs low; contract price for the warehouse, loading docks, driveways and a 12,000-sq ft office satellite structure was $4.00 a square foot.

The warehouse itself is 524 ft by 240 ft. The two-story office is 95 ft by 64 ft and the outside open storage dock, 60 ft by 170 ft, is built up to railroad car door height.

Seventy-two plywood umbrellas, 40 ft by 40 ft, form the roof. Each umbrella section is an individual component fabricated with four 20-ft by 20-ft plywood hyperbolic membranes bolted to a heavy lumber framework. The four hyperbolic paraboloids form a cone which is supported on a 12-in.

Fig. 1, top. Preformed ⅛-in.-thick plywood membrane is lowered over 40-ft by 40-ft rigid umbrella frame.

Fig. 2, center. Plywood membranes are nailed to wooden frame. In background, roof structure takes shape.

Fig. 3, bottom. Complete umbrella sections are picked up by crane, set on single center supporting columns.

by 12-in. Douglas fir column fastened at the vertex.

The fir plywood membranes are ⅞ in. thick and are fabricated by laminating two separate layers of plywood; the first layer is ½ in. thick, the second is ⅜ in. thick. Layers are placed so that joints of the 4-ft by 8-ft panels are staggered and the face grain of the base layer is at right angles to the next.

These engineered plywood membranes were manufactured by Wood-Fab, Inc., a licensee of Plywood Fabricator Service.

Each of the umbrellas was raised individually. The wood columns are on 44-ft centers, so that the umbrellas are separated from each other by four feet. An interlocking joint ties the separate sections together at the corners and develops the shell roof system. Valleys between umbrellas are decked with plywood broken by plastic skylights. Design live load of the roof system is 40 pounds per square foot.

Fig. 4. Spacing between roof sections will be partially plastic skylight, remainder plywood deck.

Walls of the unique building are 21 ft high and are built with ⅝-in. high-density overlaid fir plywood which functions both as structural sheathing over 4-in. by 8-in. sawn wood girts on four-foot centers and as a finished exterior siding.

PLYWOOD BOX BEAM DELTA FRAME

THE FIRST industrial plant built with fir plywood delta frame components has been completed in the Greeley, Colorado industrial park at a cost of only $4.88 per square foot.

Owners report that this figure includes an office loft section, two loading docks, drives and parking, industrial wiring, plumbing and finish painting.

Basically box beam bents, the delta frames can be used to produce industrial structures at costs competitive with other types of packaged buildings. More than 600 variations of the basic component were detailed by Douglas Fir Plywood Association engineers before delta frames were announced as a new product.

Pre-Bilt Components, owners of the Greeley plant and fabricators of the delta frames, used 10 of the big box beam bents, each 140 ft long, in the construction of their new component plant.

With the box beam bents on 16-ft centers, over-all length of the structure is 144 ft. Interior width is 120 ft, with the roof line extended 10 ft past curtain walls to shelter loading docks.

The plant has the classic delta frame shape: A central A-frame section with a 40-ft clear span and two flat wing sections extended from the legs of the A. Height of the A-section's ridge soffit is 27 ft; wing beams are 14 ft high.

Cost of the beams and stressed skin roof panels, also fabricated in Pre-Bilt's shop, was relatively low—about 70 cents per square foot under roof. The delta frames themselves cost $6480.

The structure has a concrete slab floor and reinforced concrete piers 7 ft, 10 in. high. Piers are unusually high in the plant to allow truck entry into the plant.

Wing beams are 50 ft long, 3 ft deep and 10 in. wide. They span 40 ft.

Inclined beams are 28 ft, 3⅜ in. long (soffit length) and taper from 30 in. at the base to 18 in. at the ridge line.

Gusset plates lock the inclined beams and wing beams into a single, rigid box beam bent, 140 ft long. The fir plywood elbow gussets—those which join the inclined beam and the wing beam over the pier—are triangular in shape and roughly 9 ft by 9 ft by 13 ft.

The roof system required 342 fir plywood stressed skin panels. Using the 40 box beams and 342 roof panels as building blocks, less than 400 separate parts were required to build a structurally independent roof sys-

Fig. 5. Fifty-foot-long wing beam is lowered into place on box beam bent. Plywood gussets will join the beams.

tem that covers about 20,000 sq ft.

The stressed skin panels have a top skin of 3/8-in. interior type fir plywood with 2-in. by 6-in. stringers on 12-in. centers. Typical panels are 4 ft by 16 ft. The ceiling-side skin is non-structural 5/8-in. gypsum board. Between the structural plywood skin and the gyp-board, 3-in. batt insulation and a vapor barrier were sandwiched-in during panel fabrication.

The finished roof on the A-frame section is of asphalt shingles; the flat roof wings have a built-up finish roof.

Pre-Bilt used stressed skin panels in an additional unique application. Special stressed skin panels only one foot wide—but in some cases as long as 20 ft—were used to make sections of what will later be overhead doors opening onto the loading docks. The long, narrow, insulated stressed skin panels are hinged together so that when tracks and pulleys are installed, the hinged stressed skin panel wall can be rolled up much like commercial garage doors.

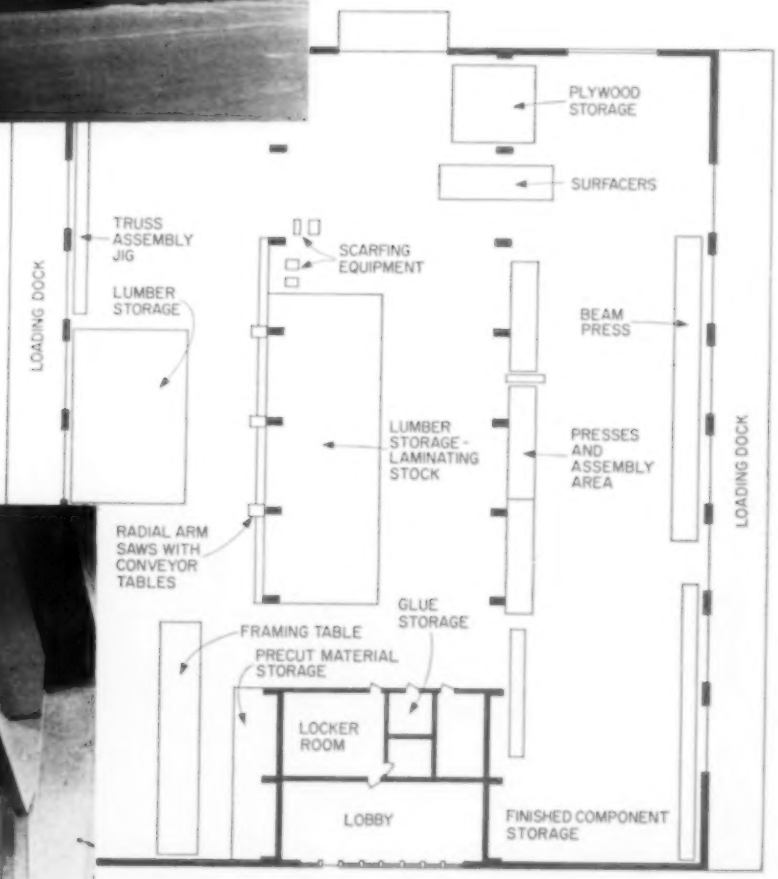
This, in effect, provides the plant with an insulated wall that also provides the advantage of wide, overhead doors. The insulation is necessary in Greeley because of the sub-zero winter weather and because precise control of temperature and humidity are required for quality control in the component facility.

In addition to the plant facilities, the structure has a loft section, 32 ft by 40 ft, which is used for business offices and drafting rooms. Located at the end wall facing an access road, the office loft is reached by a suspended staircase visible through the glass curtain wall. The other end wall is made with plastic panels.

Other walls in the structure are concrete block—although any non-loadbearing wall system is possible with the delta frames, since the box beam bents are structurally independent. **End**

Fig. 7. Exterior walls are non-loadbearing. Delta frame, stressed skin roof panels can support the roof load.

Fig. 6. Concrete piers, on 40-ft by 15-ft centers, support delta frames formed of plywood box beam components.



FLOORS, TOO SHOULD FIT THE JOB

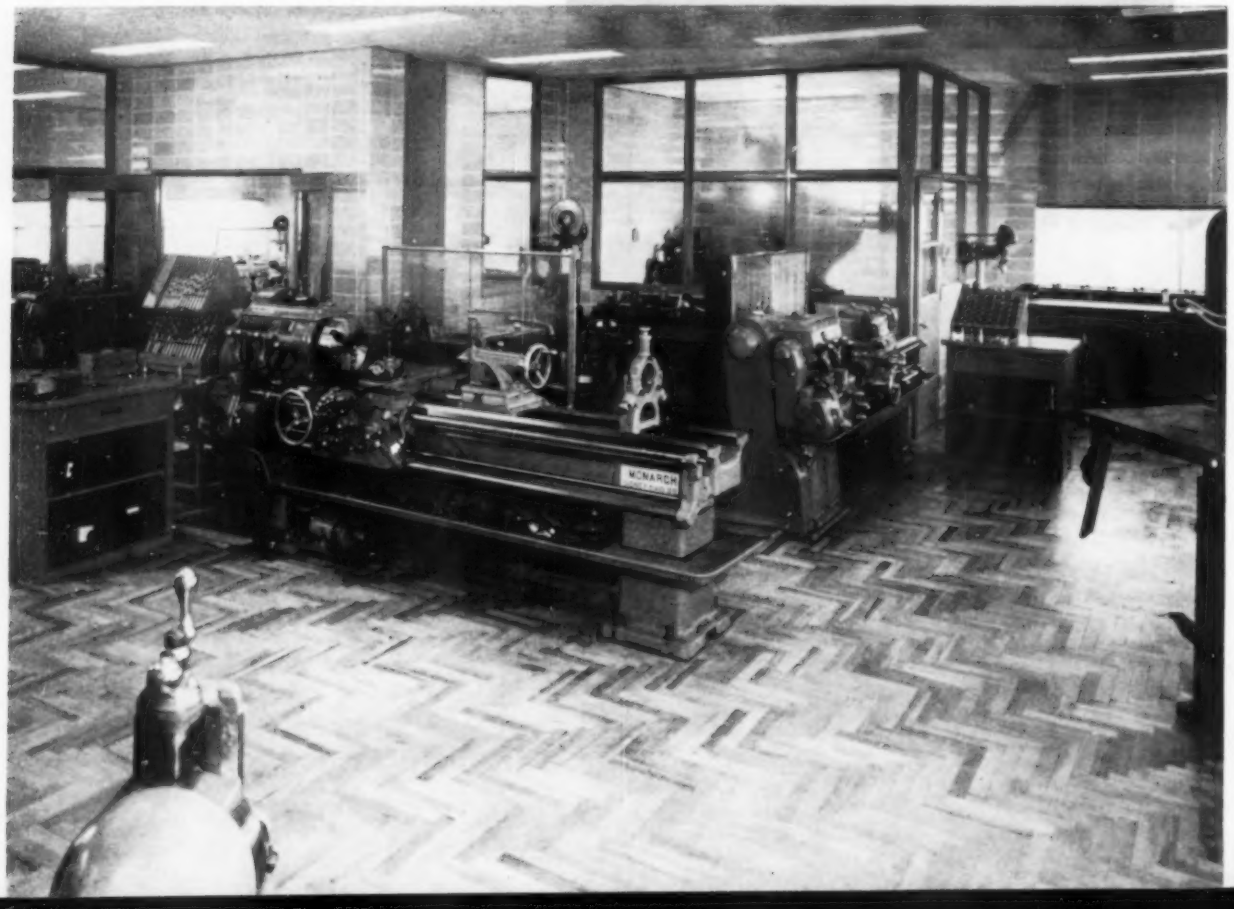
By **NEWTON ZUCKER**, Technical Director and
R. SPENCER CREW, Chief Chemist, Flooring Division
The Garland Company, Cleveland, Ohio.

EVERY FLOOR has a particular job, and is initially selected for that job. For instance, it may have to resist severe abrasion from foot and vehicular traffic, or support loads of varying weights. Or it may be selected on the basis of its ability to withstand moisture penetration, harmful oils, acids and chemicals.

Sometimes the flooring material has to offer a slip-resistant surface to guard against injuries from falling; or it may have to present a smooth surface to facilitate hand and power truck movement. In some specialized industries, the floor has to be non-dusting and easily cleaned, while in others it must prevent bacteria growth, vermin and insect infestation.

There are seven major types of flooring materials in common use today—concrete, wood, asphalt emulsion (mastic), asphalt (hot applied), terrazzo, brick and quarry tile, and magnesite and gypsum block. There is no panacea—no "cure-all" type of flooring material. Each has properties which may not be available in the others.

Fig. 1. This isn't a showroom; it's a working machine shop with wood flooring. It shows that wood, protected with a properly selected finish coating, will clean up even such traditionally dirty spots as this.



Concrete Flooring

Throughout all classes of industry, concrete flooring is the most common. It withstands heavy loads (approximately 3000 psi), gives an attractive appearance, and is reasonably easy to clean.

Concrete is not normally affected by being wet or subjected to occasional spillage of oils, some solvents, or dilute acids (such as ammonium chloride, benzaldehyde, carbonic acid, chlorine water, formaldehyde, oxalic acid, or phenol). Concrete floors must be resurfaced with some special coating if exposed to acetic acid, lactic acid, chloroacetic acid, chromic acid, citric acid, fatty acid, formic acid, or tannic acid.

Cured concrete floors subject only to foot traffic can be protected and beautified by the application of certain paints or sealing compounds that are commercially available. One word of caution, however—any concrete surface that is to be painted should be free of grease, oil and other contaminants and thoroughly dried prior to application of the paint.

Smooth, non-porous concrete not previously painted should be etched with a commercial compound or a 10 per cent solution of muriatic acid. Very dense and smoothly troweled surfaces must be etched with a commercial compound, or a 25 per cent solution of muriatic acid, flushed with clear water and thoroughly dried before applying the enamel.

Oil-and-varnish type paints provide a durable, pigmented coating for locker rooms and walkways. For interior applications where no moisture penetration is evident, a paint employing oil-modified synthetic resins and fade-proof pigments will be more economical. But keep in mind that capillary action will "lift" any oil-base paint.

To provide a more durable elastic surface coating that will resist heavy foot traffic, alkali and mild chemical spillage, synthetic rubber resin base enamel is recommended. It will stand up, even though there be substrata moisture penetration. Typical applications include dispensaries, restaurants, showers, locker rooms, walkways.

Newly cured concrete flooring can be treated with a liquid plastic or a catalyzed epoxy coating. Such a coating will eliminate the dusting, and resist abrasion and intermittent acid spillage. These characteristics are very desirable in food and dairy plants, textile and precision instrument manufacturing facilities where sanitation is paramount and dust from concrete can be detrimental to health, delicate fabrics and instruments.

Courtesy The Garrett Corporation

Wood Flooring

Wood floors wear out under the influences of rot resulting from accumulated moisture that penetrates into the pores, softens the wood fibers and decreases its strength. Sometimes the wood cell structure is crushed by heavy objects dropped on it, or by abrasive foot and truck traffic. Oils, chemicals and other solutions dissolve the wood binder, permitting the grain to separate and splinter. Insects and vermin also do their share of damage.

Wood should always be protected with a finish coating designed to withstand the service to which the floor will be subjected. Clear and pigmented finishes are commercially available with oil, alkyd resin, epoxy ester and phenolic bases.

High-quality, all-purpose floor enamels for interior floors that are not moisture-penetrated nor subjected to heavy loads or steel-wheeled trucking are compounded around an oil-modified synthetic resin base. Easily applied over previously coated surfaces or on new wood, they have excellent adhesion, flexibility and film strength, and will not chip or peel. They can be wet-mopped without harming their high gloss, and are resistant to oil and grease spillage.

Heavy-duty epoxy base floor coatings are rated good to very good for protecting interior wood floors against spillage of alkalies, water, oils, and mild acids. They are not affected by scrubbing, scuffing or washing by heavy-duty cleaning machines and strong caustic cleaners.

Phenolic resin-base coatings provide a tough finish for

Courtesy The Flintkote Co. and Gellin Co.

Fig. 3, above: Prepared like concrete mixes, cold-laid asphalt emulsion (mastic) flooring is one part cement, two parts emulsion, two parts sand, six parts stone chips.

Fig. 2, left: Terrazzo offers an attractive appearance and easy sanitation. It is usually subjected only to foot traffic such as occurs in its use in this plant clean room.

wood floors and are very resistant to water, oils, and abrasion from foot traffic. Such finishes are especially applicable to such industries as textiles or instruments, where a clean, dust-free, slip-resistant surface is required.

New wood floors should have the protection of a penetrating floor sealer, which blocks the pores to prevent the entry of dust, dirt and other contaminants. It also protects the wood fibers to some extent from the crushing and abrasion of traffic, and keeps dirt on the surface for easier cleaning. Most sealers resist staining by ink, oils, grease and fruit juices, and help prevent the formation of traffic "lanes" in aisle-ways. Although only a layer of wax is required over the sealer to protect the floor from ordinary foot traffic, special conditions may dictate the application of a mastic, plastic, or cementitious topping.

Asphalt Emulsion (Mastic) Flooring

Mastic floors are prepared in the same fashion as concrete mixes, except that emulsified asphalt is used instead of water. Since it is resilient and warm, mastic is restful to foot traffic or where workers have to stand at their jobs.

Mastic compounds are easy to apply, because they require no roughing or chipping of the base surface; they can be cold-applied right over a bonding agent.

Regular asphalt emulsion floors tend to break down under oils and certain acids, and are rated "poor" in their resistance to loads and abrasion. Their main advantage is that they are easy to maintain and repair.

Asphalt (Hot Applied) Flooring

This type of flooring is usually found on loading docks, driveways and other exterior surfaces. Although asphalt is resistant to water and weather, it will soften when subjected to oil, grease and heat. Due to these characteristics, asphalt flooring is not usually found in industrial plants.

Terrazzo Floors

Terrazzo—a slab containing marble chips surrounded by a cementitious or epoxy binder—is usually applied in lobbies, offices and other areas subjected only to foot traffic where attractive appearance is essential.

Since terrazzo can dust and chip, a colorless liquid sealing compound should be used to form a tight, water-resistant seal that closes the pores of the binding agent.

Brick and Quarry Tile Flooring

Brick and quarry tile floors are commonly found in dairies, breweries, and other industries where there is considerable spillage of water, acids and alkalies. Heavy trucking and cold temperatures are also encountered.

Although the material is substantial, it can break and chip when not properly bonded to its sub-base. A common type of failure is the disintegration of the joints. Besides making breakage easier, this "lifting" also makes possible the accumulation of moisture to harbor germs.

Magnesite and Gypsum Block Floors

Magnesite and gypsum block floors are found ordinarily as coverings over resilient, wood or metal floors where concrete-type materials do not readily bond. Since World War II, the term "magnesite" has gradually been replaced by "oxychloride" in describing this type of flooring. They have greater resistance to abrasion, solvents, oils and grease than mastics, and hold up fairly well under detergent and soap cleaning and occasional dilute acid spillage. For longest life, they require a sealer; an epoxy ester-base varnish or a wax may be used.

Other Flooring Materials

Linoleum, asphalt tile, rubber and vinyl tile are ordinarily found only in offices and in some instrument manufacturing facilities where it is subject only to foot traffic and occasional scrubbing. **End**

Fig. 4. Properly proportioned concrete—a hard and durable material—is the most common type of plant flooring. It will withstand loads of approximately 3000 psi.

Fig. 5. Wood-block floors are favored where heavy trucking is required, a high resistance to wear is needed and a resilient floor is a must for protection to dropped parts.

A Plant Engineer Looks at His Plant— THREE YEARS LATER

By **WILLIAM O. KING**, Plant Engineer, RAD Division, Avco Corp., Wilmington, Massachusetts

It was Dedication Day. The move from the old quarters into our new research center was an accomplished fact. From seven until nine-thirty a.m., the maintenance crews had scurried around on last-minute details. The first visitors began to arrive at ten. The local dignitaries were introduced. A prominent Senator and a Representative spoke in glowing terms of the wonders that were to come from these marvelous buildings located within their home districts.

The Chairman of the Board began to speak about the thought and planning that had gone into the creation of this "complex." No stone had been left unturned in an effort to provide the most modern facilities to enable our scientists to carry on their work in surroundings which were as nearly perfect as it was possible to make them. The guests breathed their awe.

But the plant engineer and his staff wondered. What would it be like after the shakedown cruise?

That was three years ago. The cruise is over. And this is what it is like.

TODAY Avco Research and Advanced Development Division's $16,000,000 center, located on a 78-acre tract some 16 miles from Boston, consists of a complex of 10 buildings (four of which are metal frame structures not included in the original construction project) with a gross area of approximately 475,593 sq ft. The net usable area is 79 per cent of the total.

The design objective of the architects was to create a university atmosphere which would provide the scientists with the quiet and solitude necessary for those engaged in research.

Buildings 1, 2, 3, and 6 are multistory structures of reinforced concrete. Building 4, the heavy machining area, and building 5, a special purpose laboratory, are both single-story units with steel framework and metal roof decks. All buildings have built-up roofs.

Unique architectural features in buildings 1 and 3 include light wells that give sunlight and a feeling of openness to interior offices. Pine trees on the site were left undisturbed during construction and now rise above the roof line.

Built into a hillside, numbers 1 and 3 are elevated 17 feet above grade on the north front. Spacious walks, bordered with evergreens, are located beneath the first floor levels, providing convenient and attractive entrances to the buildings at their lower levels.

Parking space for 1300 cars has been provided in six lots which are surrounded by broad lawns with flowering trees.

The first view a visitor to our plant gets is one of immense areas of glass and porcelain panels. The use of curtain wall construction was the subject of many discussions during the planning periods. In these discussions the more conservative participants, largely from the Plant Engineering Department, doubted the suitability of such walls in a region noted for long, severe winters. We have now lived with our curtain walls through three brutal winters, and we would recommend them. The ano-

Fig. 1. Aerial view of author's plant—actually a research and development facility. Walk under entryway canopy, left center, has proven troublesome. Light wells in buildings are marked by treetops extending above roof line.

THREE YEARS LATER . . .

dized aluminum construction and porcelain finish have required minimum maintenance; infiltration and leakage problems have been no greater than with masonry walls.

Driving to the parking area, the visitor has a view of spacious lawns, sugar maples, and evergreens. Seeded among the trees and shrubbery, however, are maintenance problems we wish we had foreseen three years ago. The parking layout, with its grass-covered islands and flowering trees, has created an expensive and difficult snow removal problem. It is impossible to plow the snow back from the parking spaces and off one end or the side of the lot; trucking 75 per cent of the snow to a dumping area is both expensive and time-consuming. Today the islands represent sorely needed parking space.

Unfortunately, before the visitor enters our lobby, he must wal': over one of our mistakes. Extending from the visitors' parking area to the main entrance is a wide terrazo walk which, while under a canopy, is exposed to the weather for 60 ft. This walk has been a "sore spot" since the date of its installation—during inclement weather, it is slippery. We have tried rough grinding it enough to eliminate the hazard and still retain the esthetic value, but when we put the sealer over the ground surface, it was as bad as ever. When wet, corrugated rubber runners and cocoa matting were as bad as the terrazzo. We finally solved the problem by re-routing the traffic over a concrete walk to a side door during wet weather. If we had it to do over again, we would use concrete with hot water heating coils, esthetics or no esthetics.

Fig. 3. Modern, well-designed, easily-maintained main entrance lobby at Avco features window walls, terrazzo floors, wood panel trim.

But if the entering visitor walks over one of our mistakes, he is also walking under one of our successes. The underside of the walk's canopy was finished with acoustic plaster. Arguments flared over the durability of such plaster when exposed to the weather. Three years later with no maintenance, the plaster is in mint condition. Even the skeptics no longer cast an anxious glance upward when entering the building.

We have been satisfied with our interior arrangements. Permanent partitions such as in corridors, restrooms, executive offices, and dining areas are of steel stud, wire lath, and plaster construction. These have been a minimum source of trouble. All other partitions are of the wood frame, movable type, with sound insulation and an outer skin of Masonite. The durability of non-metallic partitions under frequent re-arrangement operations was questioned originally, but they have proved highly flexible and have required little maintenance.

Resilient floor covering has been used throughout all main buildings with happy results. Asphalt tile, $\frac{3}{16}$-in. thick, was used in corridors and offices. In the corridors leading to the executive offices, the auditorium area, and the main cafeteria we used white vinyl tile. The maintenance problem we anticipated did not materialize. Today the tile looks like new and our cleaning costs are well below the national average.

A loop system was used in providing the various water, compressed air, and gas services through all buildings. In an effort to reduce construction costs, divisional valves were cut to a minimum. This was a mistake and if we had it to do over again, we would search elsewhere for savings. After making the first installation requiring tapping into the loop, we knew we were in trouble. The anguished cries of our customers whenever changes or repairs were necessary have finally subsided, but not until after we had replaced a lot of the eliminated valves.

One of the most important considerations when building a plant in a rural area is the stability of the pressure in the town's water mains. Three years ago we did not know this. After several cases of downtime as a result of the pressure dropping below 15 psig, we found it necessary to install automatically-controlled booster pumps in critical areas. We have never had any trouble with the volume, and while the pressure problem was solved without too much difficulty, this is a considera-

Fig. 2. Seeming overabundance of valves in water lines proves valuable "extra" in often-changing system.

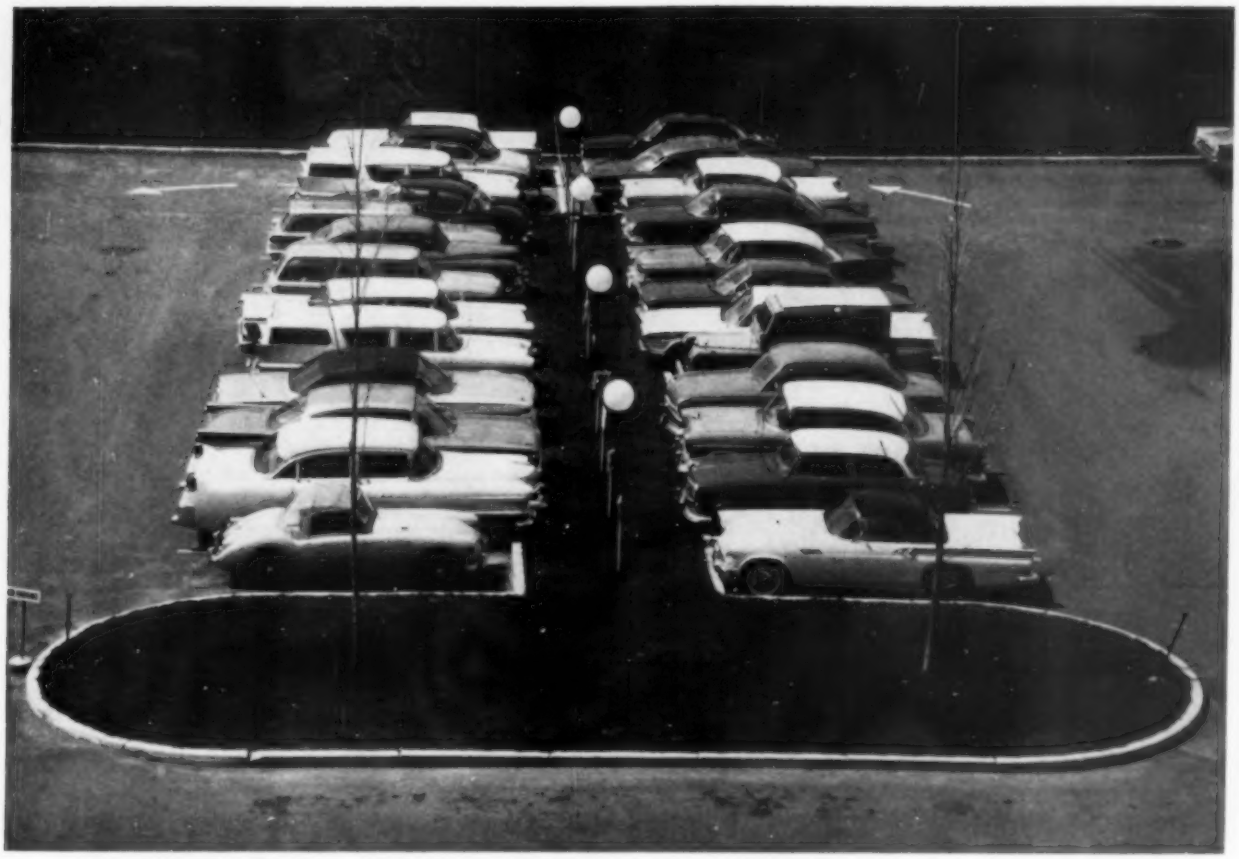


Fig. 4. Parking islands are beautiful but bothersome. Economical snow removal is impossible, grass-covered islands occupy valuable parking space.

tion on which we would be cautious if we had it to do over again.

As of this time the piping systems have proved flexible enough to meet our continually changing requirements. While not ideal in every respect, they are more than satisfactory.

Heat for the main buildings is supplied from a boiler plant with a capacity of 65,000 lb of steam per hour at 125 psig. A combination of a perimeter baseboard system and heating coils in the air distribution system is used. Both are supplied with hot water from steam-water convertors. Unit heaters are used in the heavy machining, high bay areas of building 4. Buildings 4A, 4B, 4C, and 5 are heated by baseboard radiation and unit heaters using steam at 15 psig supplied by a 5000 lb-per-hour boiler located in building 5.

Buildings 1, 2, and 3 are completely air conditioned with the refrigerating equipment located in the mechanical spaces of each building. Building 4 is partially air conditioned by unit air conditioners. The total refrigerating capacity is 1750 tons. The major portion of the condensing water is supplied by a 5000-gpm cooling tower.

Compressor Noise Problems

Shortly after moving into our new quarters, we began to get complaints from building 3 about the noise and vibration emanating from the mechanical room. The trouble was traced to the compressor which supplied compressed air to all buildings within the main complex. Flexible connectors and sound insulating ceiling tile eliminated most of the complaints, but if we were starting all over, we would locate such equipment in one main mechanical space attached to the boiler room. The additional piping cost would be small and the reduction in maintenance would more than make up for it.

In our air distribution system we used the space between the hung ceiling and the underside of the concrete slab as a return air plenum. From an air handling point of view, this arrangement worked very well, but it is not without sin. Shortly after putting the system into operation, we began receiving complaints about sound traveling from one office to another. Top management took a dim view of policy decisions being discussed by the janitorial force even before the staff meeting adjourned. And some of the young ladies in the stenographic groups did not really appreciate the bits of spicy conversation they picked up from the boys in the lab down the hall. We have finally cut the complaints to a minimum by installing sound traps in critical areas.

On the first really cold morning after occupancy, I walked into my office to find a sheet of ice about $\frac{1}{16}$-in. thick covering the inside of the windows. My first thought was to take the receiver off the hook, because I knew we were in for it. I remembered the discussions we had

A PLANT ENGINEER LOOKS AT HIS PLANT THREE YEARS LATER

had with the architects, who argued for smaller baseboard units because the larger units detracted from the appearance of the interior. We had finally acquiesced; now, after three years, we have most of our baseboard back. Another time, we would not give in quite so easily in matters involving New England winters.

Power is brought into the plant through two 15 kv, 500 MCM direct burial feeders, one of which is a spare, to a central outdoor switching station with the normal metering and relay compartments, and nine 1200 ampere, 15 kv, metal-clad, drawout air circuit breakers, two of which are used for the incoming feeders. Direct burial radial cables from the main switchgear distribute power to 15 kv/480 volt, metal-clad unit substations. Lighting is 277 v fluorescent with instant start lamps.

We are satisfied with our electrical installation. The 13.8 kv distribution system has not had a single failure to date. We have experienced only one fault on the low voltage system which was cleared by the individual circuit breaker without distortion to the bus duct conductors or interruption to any other feeder.

During the first hot, humid spell, we experienced some difficulties with our instant start type lamps which sometimes fail to fire initially under humid conditions. After a few such episodes there was some plain talk between the chief electrician and the chief operating engineer, and we have had no trouble since.

The solution—the operating engineers increased the air conditioning in the areas concerned, and the lamps now operate in humidity more to their liking.

The question may arise: What purpose is served in a study of this kind? We have two answers. First, we believe in evaluating any work we do, even in a case in which we cannot "shatter it to bits—and then remould it nearer to the Heart's Desire." And second, we hope that readers of PLANT ENGINEERING who are in the early phases of a building program may profit by some of our experiences.

And, specifically, what was our role in the construction of these buildings? Just this . . . shortly after I joined the staff, the president of RAD issued a memorandum headed "Subject: Construction Responsibility, Wilmington Facility".

Concisely outlining various areas of responsibility, the directive assigned to plant engineering: 1. construction coordination and inspection; 2. approval of shop drawings; 3. approval of mechanical, electrical, plumbing, and other working drawings. In general, these responsibilities included those normally assigned to a plant engineering department, as distinguished from the policy and administrative functions.

The next two years were fruitful ones. The plant engineering department, as the Company's spokesman, coordinated the requirements of our technical departments with the efforts of the architects and builders. The result was a tightly-knit, hard-hitting and efficient construction team, with one goal in mind—to erect the best buildings in the shortest possible time for the least amount of money.

Occasionally someone still calls to explain in minute detail just what is wrong with some phase of our building and what we would have done three years ago if we had been smart. We try to listen philosophically. We are sure, that St. Peter must be subjected to home mechanic types who know just how to make the pearly gates swing open wider. But whether it was a matter of brains or luck, we do feel we have a building in which we can live with decent pride. **End**

Fig. 5. Light-well trees, left standing during construction, provide contrast for employees in inner offices.

DIGITAL CONTROL COMPUTERS
Functions and Application

By **R. O. DECKER**, Advanced Systems Engineering and Analytical Dept.
Westinghouse Electric Corp.
East Pittsburgh, Pa.

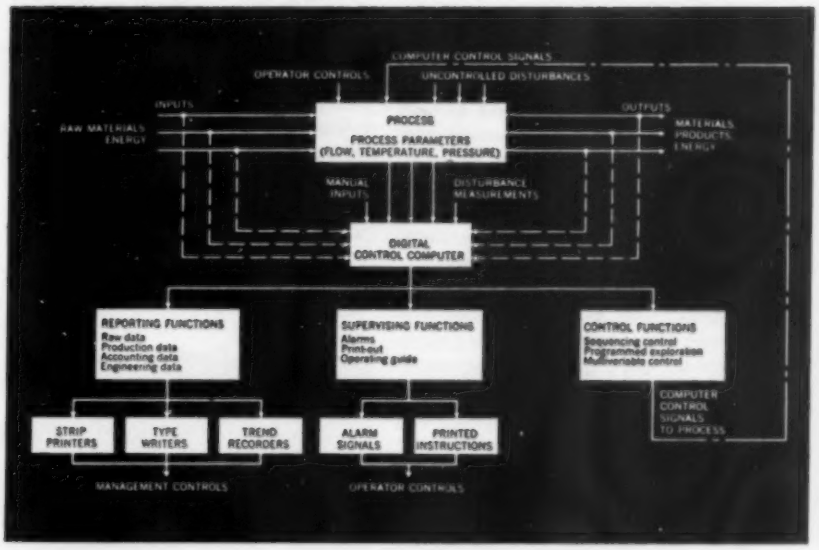


Fig. 1. Three major types of functions can be performed by a digital control computer, namely that of reporting, supervising and control as shown above.

AN INTELLIGENT SYSTEM engineering approach is required for the successful application of digital control computer in automating an industrial process. A digital control computer can perform one function, or several, and determining exactly what is needed for a particular process or plant is a critical step.

The first effort must be a preliminary study to establish the technical and economic feasibility of computer control. This, in turn, requires a thorough knowledge of the process itself, and an equally complete knowledge of the functions that can be performed by a control computer.

A digital control computer, its relation to a process, and the three major types of functions performed in the system are shown in Fig. 1. The inputs to the computer are measurements of physical input variables, measurement of plant or process parameters, measurements of certain physical disturbances, and measurements of physical output variables.

The three types of functions are categorized by the nature of the action taken by the process control computer. If the output is in the form of typed or printed records to be examined at some later date, the computer performs a reporting function. If the output is in the form of signals to the operator, the computer performs a supervising function. If the output is in the form of signals transmitted to control the process, the computer performs a control function.

In the reporting function, Fig. 2, the computer presents tabulated information ranging from raw data to complex process engineering data. Raw data presentation includes periodic print-out of process flows, temperatures, and pressures. Also, special print-out on operator demand is provided. Little or no programming is required for this operation.

By additional programming, the raw data can be "smoothed" and calculations performed to present production data. This includes totals, trends, efficiencies, operating costs, and operating profits.

Accounting data presentation includes facts for inventory records, ordering information, raw materials scheduling, the preparation of billing documents, and preparation of input data documents for other machine accounting systems.

The presentation of engineering data includes correlation of input-

output information, analysis of overall operation, data for improving existing process control, and data for building a mathematical model of the process.

Examples of these functions can be found in various steel and electric utility applications. In one automatic steam plant, efficiencies will be calculated every 15 minutes and a warning signal will be given to the operator if efficiencies are below specified limits.

In a computer-controlled tinning line, calculations of incentive pay are made from production data. In this same application, a shipping ticket, which includes quality classification, is prepared by the computer for each coil as it is produced.

In the supervising function the computer acts as an important link between the process and the process operator. See Fig. 3. In the supervising mode, the computer rapidly scans input voltages representing physical variables and compares each scanned voltage with the correct voltage stored as a digital number in the computer memory. In many cases, the scanned quantity represents the open and closed states of valves, the on or off condition of motors, etc.

The fact that a quantity is above or below a reference value can be recognized, and visual or audible alarms given when limits are exceeded. These limits may be imposed for reasons of safety, for quality control, for loss of efficiency, for low levels of product inventory, or for unsuitable values of the input material flow.

Special Print-out Programs

Special print-out programs can also be initiated, giving the numerical values of the deviation from desired levels of any abnormalities. Under certain conditions, such as process equipment failure, a history of events preceding the failure is desirable. The computer can be programmed to preserve readings on a logarithmic scale for a previous ten-hour period.

A great advantage of the stored-program digital computer over a simple data logger-scanner is its capabilities when an abnormality is encountered; here the computer can be programmed to enter an analysis mode of operation, in which it examines the surrounding conditions and prints out an analysis of the situation.

For example, a high temperature at a point in the system can be indicated by an alarm; in addition to simple alarming, the computer can be programmed to interrupt its normal scanning cycle and scan temperatures and pressures of adjacent process areas.

The control functions of a process control computer are the most advanced operations, although the sequencing control operation is relatively simple. See Fig. 4. Sequencing control involves logical decisions in carrying out emergency actions, in starting up and shutting down a process, or in changing the mode of operation of a process.

Sequencing Control Application

Sequencing control has been applied in the steel industry to control the sequenced operation of a rolling mill. In the electric utility industry the starting and stopping procedures of turbine generator operation are examples of sequencing control.

Programmed exploration involves the changing of controlled process inputs in discreet steps and recording the resultant changes in the process outputs. This type of exploration can be used for two purposes: to carry out an experimental type of optimizing control; or to develop a mathematical model of the process.

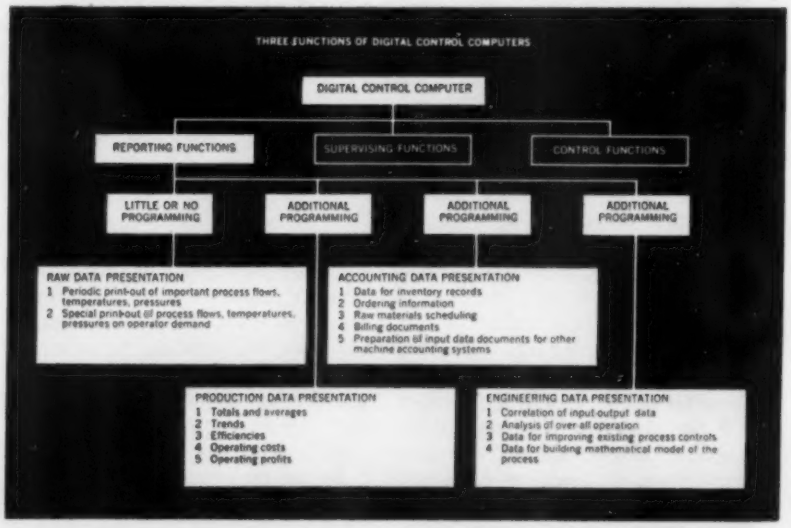
Multivariable control is a level of control beyond that provided by single-loop analog controllers. For example, the controlled quantity may be represented by several output variables; the desired quality may not be measurable directly but may be a computed function of temperatures, pressures, densities, or other variables.

In non-interacting control, the interactions among several input and several output variables are greatly reduced or eliminated. For example, such a control might be designed so that a change in one input variable causes a change in several output variables. To change only one output variable and hold the others constant, additional input variables would have to be changed at the same time.

Optimizing control based on a mathematical model of the process involves the solution of equations to find a maximum or a minimum value. The mathematical model may be either linear or nonlinear. To date, such controls have been based on a steady-state model of the process.

Feedforward control anticipates the effects of disturbances occurring "upstream" and makes adjustments

Fig. 2. Raw data can be reported with little or no programming. Other types of reported information appearing on chart require additional programming.


THREE FUNCTIONS OF DIGITAL CONTROL COMPUTERS
DIGITAL CONTROL COMPUTER
REPORTING FUNCTIONS
SUPERVISING FUNCTIONS
CONTROL FUNCTIONS
LITTLE OR NO PROGRAMMING
ADDITIONAL PROGRAMMING
ADDITIONAL PROGRAMMING
ADDITIONAL PROGRAMMING
RAW DATA PRESENTATION
1 Periodic print-out of important process flows, temperatures, pressures
2 Special print-out of process flows, temperatures, pressures on operator demand
ACCOUNTING DATA PRESENTATION
1 Data for inventory records
2 Ordering information
3 Raw materials scheduling
4 Billing documents
5 Preparation of input data documents for other machine accounting systems
PRODUCTION DATA PRESENTATION
1 Totals and averages
2 Trends
3 Efficiencies
4 Operating costs
5 Operating profits
ENGINEERING DATA PRESENTATION
1 Correlation of input-output data
2 Analysis of over-all operation
3 Data for improving existing process controls
4 Data for building mathematical model of the process

to compensate for disturbance effects.

The order in which these three main functions are listed represents the evolution of computer applications. At first the only function entrusted to digital devices was the accumulation of information from the process and the logging of this information for the operator's use and for permanent record.

Operator Assistance

Engineers soon discovered that digital computers were able to do much more than scan and log data. The small additional cost of a digital computer over a data logging system was justified on the basis of the additional supervising function that a digital computer could offer. Thus the computer was allowed to assist the operator in the many decisions. At this stage, however, action was taken only by the operator.

With the accelerated improvement of components (transistors, core memories) and design techniques, digital computers have proven themselves fast and reliable enough for the control function.

In almost all applications the stability of the control scheme must be proved before the computer control system is installed. Stability can be proved either analytically or (in the case of more complicated systems) experimentally. The experimental studies are performed on a simulated model usually on an analog computer.

If the control scheme is feasible and inherently stable, the next step is to convert it into a sequence of logical operations that can be programmed into a digital computer. This sequence of computer logical operations is represented by flow charts. The translation of information in the flow charts to a sequence of instructions is done by skilled programmers.

Often the experimental data available from the process is not sufficient to establish exact relationships between variables. In this event, the computer can be used to accumulate and correlate data from the process after it is installed. When sufficient data has been accumulated, improvements can be made in the control program and the computer can go into closed-loop operation.

Fig. 3. In supervising operations input voltages are scanned by the computer. Voltages are compared with correct voltage in computer memory.

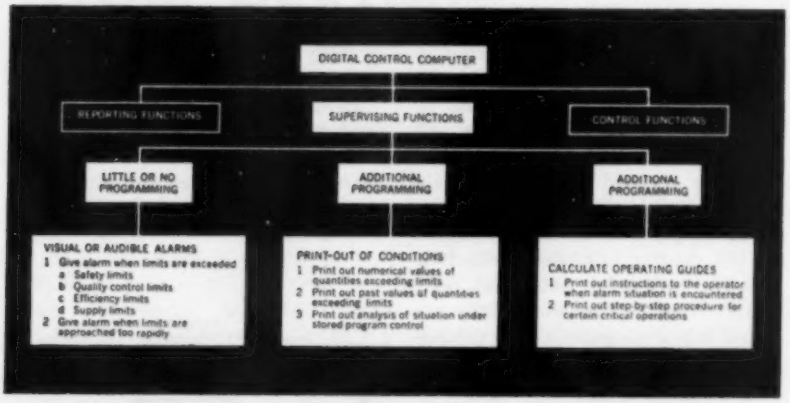
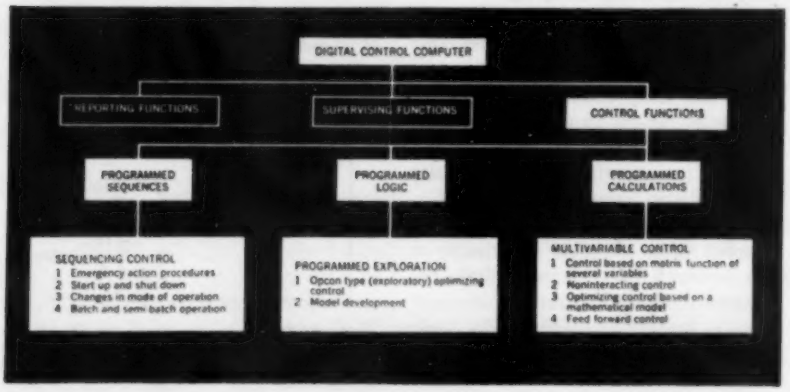

DIGITAL CONTROL COMPUTER
REPORTING FUNCTIONS
SUPERVISING FUNCTIONS
CONTROL FUNCTIONS
LITTLE OR NO PROGRAMMING
ADDITIONAL PROGRAMMING
ADDITIONAL PROGRAMMING
VISUAL OR AUDIBLE ALARMS
1 Give alarm when limits are exceeded
a Safety limits
b Quality control limits
c Efficiency limits
d Supply limits
2 Give alarm when limits are approached too rapidly
PRINT-OUT OF CONDITIONS
1 Print out numerical values of quantities exceeding limits
2 Print out past values of quantities exceeding limits
3 Print out analysis of situation under stored program control
CALCULATE OPERATING GUIDES
1 Print out instructions to the operator when alarm situation is encountered
2 Print out step-by-step procedure for certain critical operations

Fig. 4. Sequencing rolling mill performance, optimizing operations, effecting "upstream" disturbance adjustments are some computer control capabilities.



Study of Variables

In some applications the system operation and relationships between variables are well defined and therefore the design of a control scheme is relatively simple. In others, great preliminary study effort must be devoted to defining the relationship between variables. Some applications are of the simple sequencing type while others use fast dynamic control.

The success of any computer-control application depends on the system engineer's thorough knowledge of the system, his familiarity with what a digital computer can do, and, to a measure, his ability to recognize similarities and differences with other applications.

System engineering, as applied to industrial digital computer control systems, can be defined as the economic and scientific coordination of production machines, digital computers, related input-output devices, transducers, and instrumentation. System engineering is usually performed by a team, because plant operating methods, equipment performance, operator's capabilities, control techniques, and many economic factors must be considered in applying a computer to automate a plant or process.

Thus, the team must include engineers with detailed information about plant operations. In some instances, this information can be supplied by industry engineers from the computer manufacturer; in many instances, the information must be supplemented by the customer's engineers, who become full or part-time members of the system engineering team.

Also, the team must include engineers who understand the limitations and capabilities of the plant equipment and its control, including the necessary instrumentation and transducers to couple the computer to the process. **End**

Fig. 1. Sensitive d-c relays operate reliably over a longer period with contact protectors.

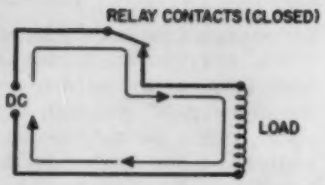


Fig. 2. Typical circuit through inductance shows normal current flow.

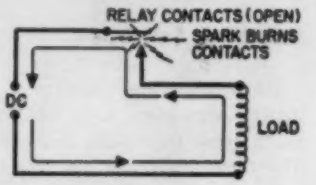


Fig. 3. When relay contact opens, current reverses, causing sparks.

SPARK SUPPRESSION EXTENDS RELAY LIFE

By **HOWARD T. BAILEY**, Electrical Engineer, Universal Foundry Co.
Oshkosh, Wisconsin

ELECTRICAL CONTROLS used in industrial machine automation frequently employ sensitive d-c relays to control motors, solenoids, contactors, heavy duty relays, valves and other inductive loads, Fig. 1. It is well known that opening a set of contacts in a d-c circuit containing a large inductance will cause severe sparking and wear on the contact surfaces. This is commonly called "inductive kick".

When a circuit is broken under these conditions, the collapsing magnetic field generates a high voltage which causes a current flow in the opposite direction. A typical circuit with normal current flow is shown in Fig. 2. When the relay contacts open, Fig. 3., current flow reverses and sparking results at the contacts.

There are several methods that can be employed to reduce this sparking and prolong life of relay contacts. One method accomplishes this result by providing a low resistance path across the inductance, Fig. 4. In this circuit a diode is reverse-connected across the load. When the inductive device is operating, current flow through the diode is small because of its high back resistance. When the relay opens, the counter electromotive force generated by the collapsing magnetic field in the inductance is of opposite polarity and the resulting energy is dissipated in the low forward resistance of the diode.

In the past, diodes have been used in this manner to protect contacts in circuits powering industrial relay coils. We have also successfully applied this same principle to protecting contacts feeding motors and other heavy duty magnetic equipment. Where the peak value of the counter electromotive force is greater than the rating of the diode, two or more may be connected in series.

A different approach to this problem places the diode directly into the circuit as shown in Fig. 5. In this case, the diode must be capable of carrying the continuous current required by the load. Several diodes may be connected in parallel to obtain this load handling capability.

With the diode in the circuit, direct current flows through the diode in the forward direction with little resistance. However, reverse current flow is prevented by the high back resistance of the diode which effectively blocks this spark-producing current flow.

In some cases series circuits have proven more effective than the parallel circuit. The circuits have all contributed to reduced downtime and cost of applying the devices is very low. **End**

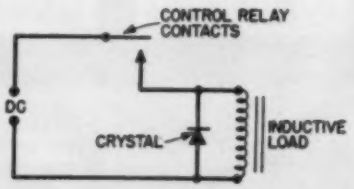


Fig. 4. Crystal diode across inductance absorbs reverse current.

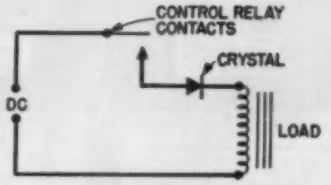


Fig. 5. Diode in series with load blocks reverse current to contacts.

Courtesy The National Supply Co.

Fig. 1. Above: Diesel-engine exhaust silencer heats water with energy that is extracted from outgoing gas.

Some Points To Consider WHEN PLANNING ON HTHW HEATING

By **SANFORD C. BENNETT**, Plant Engineer
American Technical Company, Merrick, N. Y.

POPULAR in England as well as on the Continent, high-temperature, high-pressure hot water is becoming of interest to plant engineers here. Economical generation, easy application and control make high-temperature water ideal for many processes where a steady flow of heat is required.

Among its many uses are those in rubber vulcanizing, textile processing, soap production, drying of various materials, space heating, plating, dyeing, and paper manufacture. With such a varying range of application, plant engineers today are faced with determining when and where high-temperature water can economically replace steam.

High-temperature water systems differ from standard hot water systems in two respects: (1) the water is at a higher temperature, 250 to 400 F or higher, as compared to 180 F or less; (2) the water is at a higher pressure, up to 300 psia or higher as compared to 15 psia or less.

Since pressure in the system is above the saturation pressure, water in such a system is sometimes called superheated water. However, the simpler term (high-temperature water) is generally preferable.

The first step in choosing a high-temperature water system is to list the heat loads you expect. The accompanying table shows data for establishing high-temperature water as a suitable medium for plant use. It lists the devices served, the media heated, temperatures required, types of heat release needed, and amounts of heat required in Btu's per hour. Values shown are for a typical moderate-size industrial plant.

A summation of the values in column five indicates how much heat must be supplied by the water. Highest temperature required can be used to arrive at pressure that can be carried in the boiler to supply the heat. Some allowance must, of course, be made for heat losses in the piping.

The most common heat source for a new plant using high-temperature water is a boiler that closely resembles standard steam boilers in design and operation. However, instead of discharging steam to the system it supplies water at an elevated temperature. Existing steam boilers of almost every type can be converted to supply high-temperature water.

Alternate heat sources for high-temperature water include steam heat exchangers, internal-combustion engine exhaust gases, and extraction steam from turbines or steam engines. Figure 1 shows a diesel-engine exhaust silencer piped to supply high-temperature water.

When specifying a boiler that will supply high-temperature water, be sure to give the manufacturer complete details of the installation. In most systems, boilers of the forced-circulation type are used. Such boilers have separate water circulation pumps. Additional pumps (called system circulation pumps) are gen-

erally used because high heat demands may overload the boiler circulation pumps.

Careful selection of pipe size is of utmost importance in high-temperature water systems. The size chosen reflects on the pumping power, heat loss and first cost.

Since some high-temperature water installations may supply heat to units which are a mile or more away, the design temperature drop is extremely important. The usual temperature drop selected is in the range of 75 to 150 F but special job conditions may raise or lower this range.

The general practice today is to size supply and return mains for a friction loss of about 1¼ psi per 100 ft of length. Branch lines supplying heat exchangers of all types have friction losses of 1¼ to 3½ psi per 100 ft of length. This does not include the resistance of the heat exchanger. Total friction head in usual systems is 75 psi or less.

Discharge pressure which the circulating pump must develop depends on friction loss in piping and fittings, static head that must be overcome and pressure loss through heat exchangers in the system.

The supply and return mains for high-temperature water systems are equal in size because the same quantity of water returns to the boiler as leaves it. Leaks may account for small losses but not enough to permit a reduction in the pipe size. The return line may be above or below the supply pipe, depending on which arrangement has the most advantages. Because the circulating pump provides positive movement of the water, neither line need be pitched.

Since the piping system is completely closed, welded lines are usually used. No traps, pressure-reducing valves, separators or drains are needed in the system. The only auxiliary devices needed with the piping system are air chambers and sediment legs.

Insulate all high-temperature water lines and branches. This reduces heat losses from both the supply and return mains. When the pipes are run under the ground, tunnels are not necessary if the lines are properly protected by insulated conduits sealed against moisture. Anchors and expansion joints similar to those in usual steam piping systems are required and should receive careful attention.

Though one circulating pump is sufficient to handle the water requirements of the average system, two units are always installed, because there must be some provision for continued service during repairs and maintenance of one unit. Usual pump design resembles that of a feed pump for moderate boiler pressures, with temperatures in the 200 to 400 F range. Centrifugal pumps are used exclusively for circulation of the hot water, reciprocating pumps being unsuitable.

To prevent pump overheating, it is general practice to use water at normal temperature to cool the stuffing box, shaft bearings and gland. Capacity of the pump depends on the system heat demand. Where there is a large fluctuation from one season to another, between summer and winter for example, three pumps may prove more economical than two.

The third pump has about half the capacity of either of the other two and runs singly during summer. During heavy winter overloads the half-capacity pump is run to assist one of the larger units in meeting the demand.

If service continuity is a must, as is often the case, provide two different power sources for the pumps. Electric motors, steam turbines, and diesel and gas engines are suitable power sources, depending on plant heat balance and layout. Be sure the circulating pump suction line does not have sharp bends in the inlet. These bends can restrict flow, which leads to flashing in the intake. Water hammer may also occur.

One major design and operating precaution for all high-temperature water systems is to guard against leakage and unauthorized drainage of water from supply and return lines. Every gallon of water removed from the system represents a waste of valuable heat. If excessive quantities of hot water are removed from the piping, the high-temperature water system loses its advantage over a steam system.

Since the piping is a closed loop, the water remains pure if treated before introduction into the boiler.

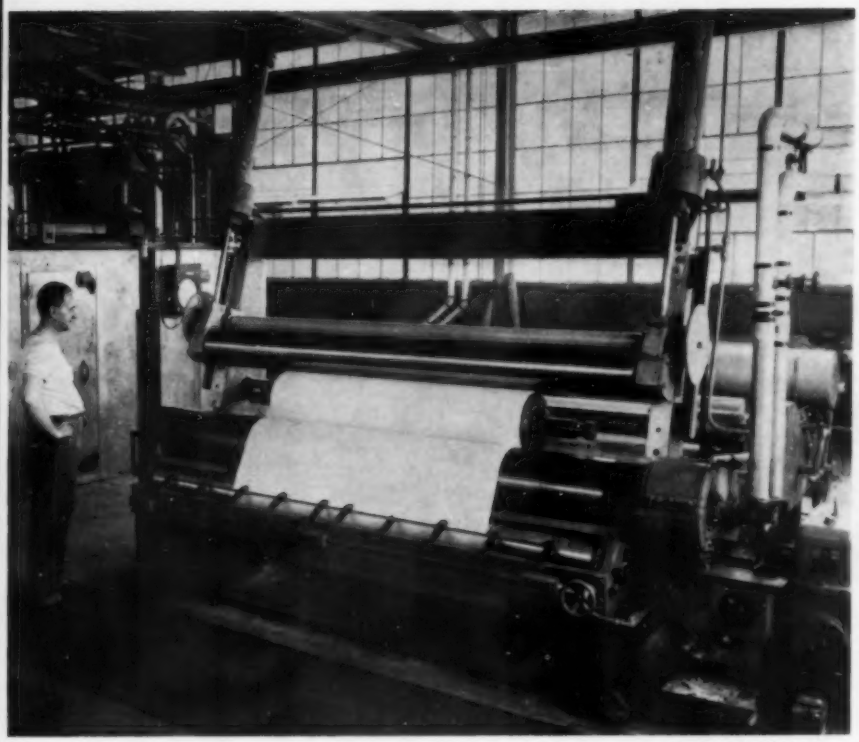
Then high-temperature water does not need treatment if water makeup to the boiler is small. This condition occurs only when leaks and unauthorized use of the water are prevented at all times. Well-designed and well-run systems do not corrode because little air is present.

Carefully choose the chemical treatment for makeup water because the water will be in use for many years if leakage is held to a minimum. It is foolish to try to save a few dollars on the initial cost of a treating system if poor results are going to plague you for years to come.

Though high-temperature water has many process advantages, the major advantage is the fuel saving

Sample table for studying feasibility of using HTHW in industrial plant.

Devices Served	Medium Heated	Temperature Required	Type of Heat Release Needed	Heat Required, Btu per hr
20 convectors	Room air	180 F	Uniform	130,000
50 unit heaters	Room air	200 F	Uniform	2,000,000
120 dye vats	Dye	250 F	Uniform	20,720,000
8 dryers	Cloth	200 F	Cyclic	2,150,000
		Total heat required, Btu per hour		**25,000,000**



Courtesy Synthane Corp.

Fig. 2. Bottom rolls of tube-winding process machine are heated by high-temperature water at 320 F. Temperature is controlled by throttling.

obtainable over steam systems. Fuel savings vary with the plant, processes served, and a number of other factors. However, studies show that savings of well over 33 per cent have been obtained by a number of plants.

Reduction in fuel consumption in high-temperature water installations comes from: (1) high-efficiency boilers that do not have scale troubles; (2) reduced heat loss from piping system; (3) elimination of condensate return piping and the losses that are always connected with it; and (4) better heat storage that permits more uniform loading of boilers and other heat-producing units.

Not all high-temperature water installations are completely new. In many plants, existing steam systems are being converted to convey hot water instead of steam. The same supply piping is often used but the larger return lines must be installed to handle the water or an extra pipe must be installed. Though the cost of this work may seem high, the fuel savings often make it possible to pay off the additional investment in a relatively short time.

When considering conversion, remember that steam control valves, traps, separators and drips are not needed with hot water. These are usually removed and other fittings substituted for them. Your best guide in conversion work is a consulting engineer with long experience in this field. Equipment manufacturers are also helpful.

In general, you cannot purchase a packaged high-temperature water system for a large plant at the present time. That is why help from a consultant or a manufacturer is almost always needed. There are, however, small packaged units available using either hot water or another fluid.

Where an existing steam system is large it can be converted gradually until all steam piping carries hot water. Of course a program like this requires careful planning so production is not interrupted.

Investigate high-temperature water for your plant today if your fuel bills are high or if you need more heat for process or comfort. There is a good possibility that it may be the low-cost, dependable answer to your heating problems. **End**

APPLICATIONS OF HIGH-TEMPERATURE WATER

Textiles: Biggest field here is in the dye house where large heat savings are possible. Coils are installed around the dye vats to transfer heat from the hot water to the dye.

Plastics: Hot water is circulated through press platens, giving uniform curing temperatures. There is no danger of overheating; air pockets in platens are almost unknown when hot water is used.

Chemicals: A wide range of heating problems is easily solved in this industry with high-temperature water. One common application is in vulcanizing of rubber. Extensive heat savings are possible.

Ceramics, Tiles: Drying, which requires close regulation of temperatures, is a major application of high-temperature water. Temperature regulation is easier, permitting greater output at lower cost.

Space Heating: High-temperature water is suitable for use in convectors, radiators, unit heaters, panels, baseboards, etc. It may be transmitted from a central boiler plant to isolated buildings with extremely little heat loss. Therefore, it is ideal for many space-heating problems.

Snow Melting: Radiant panels in driveways, parking lots and roads are easily installed, save much labor during heavy snowfalls. High-temperature water is the best medium for melting snow by this means.

DATE February 6, 1961 **MAINTENANCE WORK AUTHORIZATION** NO. Yearly

INSTRUCTIONS FOR WORK TO BE PERFORMED — WORK ORDER NO.

PAINT BOOTH

(1) Complete inspection, inc. vent, blower, motor & controls OK
Blades on vent blower loose
Clean blower blades.

H. E. White

CRAFT: CARPENTER, ELECTRICIAN, MASON, MILLWRIGHT — ORDER REC'D BY — LOCATION (Bay No.) OF WORK — DEPT TO BE CHARGED 14 — ACCT TO CHARGE — DATE ASSIGNED — FINISH
GENERAL CLASS OF WORK — BUILDING — MACHINE NO 3-2706 — FACILITY — ESTIMATED HOURS — ASSIGNED TO
MATERIAL REQUIREMENTS

DATE February 6, 1961 **MAINTENANCE WORK AUTHORIZATION** NO. Semi-Annually

INSTRUCTIONS FOR WORK TO BE PERFORMED — INTERNAL GRINDER — WORK ORDER NO.

(1) Feed mechanism OK
(2) Screws & nuts OK
(3) Bearings OK
(4) Dressing mechanism OK
(5) Kicker OK
(6) Diamond bearings OK
(7) Adjusting screw & rack OK
(8) [illegible] mechanism OK
(10) Dressing trip dog OK
(11) Pressure & support rolls OK
(12) Reg. wheel & gage-matic mechanism OK
(13) Link & cylinder OK
(14) Elect. boxes & switches OK
(15) Controls & timers OK
(16) Hyd. pump & pressure valves OK
(17) Leveling, motor & controls OK
(18) Table ways & oil supply OK

W. E. White

DATE February 6, 1961 **MAINTENANCE WORK AUTHORIZATION** NO. Quarterly

INSTRUCTIONS FOR WORK TO BE PERFORMED — WORK ORDER NO.

A.S.F. FURNACE

(1) Brickwork OK
(2) Burners OK
(3) Overall check OK

DATE February 6, 1961 **MAINTENANCE WORK AUTHORIZATION** NO. Monthly

INSTRUCTIONS FOR WORK TO BE PERFORMED — WORK ORDER NO.

6" AGME FURNACE

Check thermostatically controlled valve to be sure water is hot OK

H. E. White

CRAFT: CARPENTER, ELECTRICIAN, MASON, MILLWRIGHT, PIPE FITTER, WELDER, OTHER — ORDER REC'D BY — LOCATION (Bay No.) OF WORK — DEPT TO BE CHARGED 11 — ACCT TO CHARGE — DATE ASSIGNED — FINISH
GENERAL CLASS OF WORK — BUILDING — MACHINE NO 2-5100 — FACILITY — ESTIMATED HOURS — ASSIGNED TO — WORK HOURS — WORK ORDER
MATERIAL REQUIREMENTS
TYPE OF WORK: SCHEDULED, INSPECTION, EMERGENCY, BREAKDOWN — CAUSE OF MAINTENANCE WORK

Fig. 1. Maintenance Scheduler issues work orders to the machinery inspector. By so doing he reduces clerical work which inspector has to do.

Fig. 2. Machine tools are among the many equipment pieces to be checked.

An Experienced Observer— THE MACHINERY INSPECTOR CHECKS PLANT EQUIPMENT

By M. D. O'HERN, Works Engineer, Hammond Div., American Steel Foundries, Hammond, Ind.

OUR MACHINERY INSPECTOR has only about five years to his credit in that capacity. However, prior to that he had 20 years experience in industry, preceded by 10 years in the construction field. Within industry he has had a varied experience as machinist, millwright, and millwright supervisor.

Here's a little background on the plant where this machinery inspector is employed. Our plant has 700 employees. It contains about 500 pieces of capital equipment, covers 40 acres of grounds, and has 10 acres of buildings. The average building is about 30 years old. We don't have the glamour of nice, new buildings. Nor do we have the glitter of the exotic atomic age products. However, we do have an inordinate pride in a special family possession—in this case a well-engineered maintenance program.

The imperative trend to engineered maintenance—as contrasted to the traditional stamping out of fires—has been recognized throughout industry. Unfortunately, however, well-engineered programs have been fairly well restricted to the large industries or those of the more or less exotic groups dealing with medicine, atomic energy, rockets, missiles. In the run-of-the-mill old-time plant they seldom had taken the time or had the opportunity to set up an engineered program. However, we have been fortunate to be under the direction of some rather dynamic management and were able to establish an engineered program about six years ago.

Theoretically the program is called a Preventive Maintenance Program. A better name might be an Engineered Maintenance Program. Choice of names aside, the engineered program includes the following. 1. The Machinery Inspector 2. Lubrication 3. Scheduled work 4. Records.

Engineered lubrication, scheduled work, and records have been interestingly and advantageously written up by others. We're unreasonably proud of our over-all maintenance program and believe that all developed phases are sound. For this article, however, we propose to highlight the machinery inspector.

Employment of a machinery in-

Fig. 3. Drive belts on shaker table are other items which are subject to examination.

Fig. 4. In his work the inspector makes observations for coolant system leakage.

spector, is, we feel, somewhat novel for a medium-sized plant. Perhaps it is even somewhat novel to large plants. Many plants have electrical inspections on a formal basis. However, many people in such plants, when pressed into a corner, may admit that most other inspections are on a catch-as-catch-can basis. Theoretically, equipment is supposed to be under the continual inspection of the production supervisor and casual inspection by mechanics.

Any top management that makes this assumption has never faced the harassments of the minute-by-minute life that the production supervisor faces. He simply does not have the time to make regular inspections of his facilities. With the introduction of more automatic equipment, with more electronic, pneumatic, and hydraulic mechanisms and controls it will be virtually impossible for the production supervisor to have more than a casual acquaintance with his equipment.

Many managements still assume that supervisors make continuous inspections of their equipment. The production supervisor not only does not have the time, but more important, he also has no formal program for checking critical or non-critical areas.

The desirability of periodic and regular inspections is recognized by everyone. Not recognized by all too many managements is that such inspections will not be made unless a formal program is set up to make such inspections.

Our management realized that regular inspection must be an integral part of a solid PM program. Not only was the necessity realized but concrete steps were taken to make such regular inspection possible. One man was assigned the duties of machinery inspector. (So convinced was our management of the importance of this phase of the established PM program that it was first proposed that three such inspectors be employed. In any case management was ready and willing to take whatever steps were necessary to provide regular inspection of our 500 pieces of capital equipment.)

Job Put on Salary

So much value is put upon the tasks of the machinery inspector that his job was put on salary. Not only that, but as will be developed later, he reports directly to the works engineer and is responsible only to him.

On a somewhat iconoclastic plane we have shied away from the seemingly universal tendency to systematize maintenance to the *n*th degree. Maybe we could be subject to criticism by some in higher echelons who know maintenance only as a cost item on the monthly report that flits across their desk. In any case, for plants of medium size such as ours it is our conviction that pursuit of detailed maintenance standards, estimates of every task, elaborate instructions are not worth their expense—not by anywhere near their cost. Bear in mind, this is said of the medium-sized plant.

Our method of establishing a schedule for inspection was actually a very obvious one. One machine at a time was studied. Participating in the study were the engineer hired to install the program, the electrical supervisor, the pipe-fitter supervisor, the repair machinist supervisor, and yes, sometimes the maintenance mechanics and even the operator.

No source of helpful information was overlooked. For the given machine, the manufacturer was contacted to provide the latest manuals and information on maintenance. These manuals were reviewed along with the information developed locally. From these two sources the points of inspection and the inspection periods were determined.

Such steps are obvious. It must be borne in mind, however, that to make such a study of 500 machines does take time. This means that someone must be assigned to this task for a period of several months. This kind of assignment requires the attention that only a full time individual can give it.

After 500 machines are so studied and the inspection program for each is determined, there remains the me-

Fig. 5. Oil samples are removed on a regular basis from hydraulic systems and checked for dirt and contaminants.

Fig. 6. A file of the master inspection schedule is kept at machinery inspector's desk in the maintenance office.

chanical step of blending the thousands of inspections into a coherent program, with a fairly uniform workload for the inspector. This, again, is a mechanical, but highly important part of setting up the program.

Some parts of some machines are checked only once a year. Other parts or other equipment must be inspected weekly—and in some cases, daily. It so happens that the resultant load for our inspector is eight machines per day. Some of these inspections can be as simple as the yearly inspection schedule for the paint booth shown in the forms appearing in Fig. 1.

Maintenance Scheduler

Working with the inspector is the Maintenance Scheduler who is responsible for issuing all maintenance work orders. See Fig. 1. The scheduler issues inspection work orders in the same manner as he issues regular work orders for lubrication, or regular work orders for periodically scheduled work. In other words, the inspector's main time and talents are devoted to inspection with only a minimum of effort in clerical work.

Inspection Schedules

A good example of the routine followed by the machinery inspector is the inspection schedule for a shot blaster. Figure 8 shows a monthly inspection schedule for the shot blast machine and its dust collector. (As a sidelight there is also a weekly schedule and an annual schedule for different points.)

When making his inspections the machinery inspector does considerably more than just make the rounds. The equipment is checked while idle and when under power. The inspector also asks the help of the operators, who are, not surprisingly, only too anxious to have their equipment in good operating condition.

Operators have the advantage of greater familiarity with their equipment. Many of them have a certain amount of pride in the facilities used by them in their daily work. The operators have been most helpful. Obviously, the machinery inspector cannot be a master of all types of equipment—lathes, hammers, upsetters, presses, cranes, boilers, trucks, furnaces. But with his all-around ability and the help of the operators more than just a passable inspection is made as scheduled.

Review of Inspection

The inspection is reviewed with the supervisor involved. This serves the double purpose of giving the supervisor the opportunity of making known any defects not brought out by the original inspection, and gives the supervisor the latest report on the condition of his equipment. (Later on in this article, it will be shown that the same day the inspection is made, a copy of the inspection report is sent to the supervisor.)

Because so much importance is placed upon the inspection phase of the PM program, the inspector reports directly to the works engineer. Each day the inspection reports of the previous day are reviewed. Weighing the production demand for the equipment with the degree of work needed, decisions are made promptly to have the work done immediately or to take steps to obtain time from the production control department to do the necessary work.

Actually, under an inspection program, the need for scheduling downtime for repairs happens infrequently. Ninety-five per cent of work reported as necessary can be done in a matter of a few minutes—or, occasionally, in a few hours.

The machinery inspector issues a monthly report on his machinery in-

HYDRAULIC OIL INSPECTION REPORT
JANUARY 1961

FM&A MACHINE SHOP

Unit No.	Name of Equipment	Code No.	Remarks
3-0203	Cincinnati Centerless Grinder	A-20	OK
3-0205	Cincinnati Centerless Grinder	B-12	OK
3-0206	Cincinnati Centerless Grinder	D-11	OK
3-0207	Cincinnati Centerless Grinder	D-15	OK
3-0208	Cincinnati Centerless Grinder	D-13	OK
3-0214	Heald Sizematic Grinder	D-16	
3-0216	Cincinnati Centerless		OK
		E-17	OK
3-0815	Cincinnati Duplex Milling Mach.	C-10	OK
3-0825	Kearney & Trecker Milling Mach.	C-11	OK
3-1112	Centering Machine	C-9	OK
3-1535	LaPointe Broach	C-6	OK

Page 1 of 7

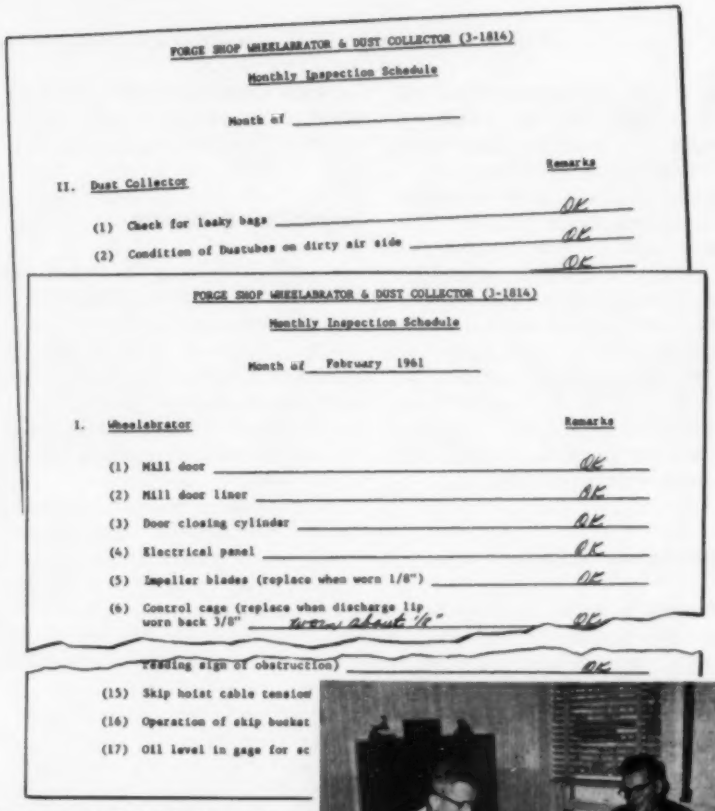
Fig. 7. Report entries of hydraulic oil inspection. There are around 100 systems from which samples are taken.

spection activities. Copies go to the works manager, the works engineer, and the maintenance supervisor.

Deserving of special comment are the remunerative sidelines of the inspector. First and foremost of these added features is the machinery inspector's role in the regular inspection of equipment with hydraulic systems.

In our plant there are 100 such hydraulic machines—lathes, grinders, presses, elevators. These hydraulic systems are checked every 90 days. The inspection consists of the removal from the system of 10 cc of the oil. See Fig. 5. An immediate inspection of the oil is made to see if immediate action is required. This is a rarity of the first magnitude. With much greater frequency the inspector codes the sample and proceeds to take similar samples from the remaining systems until 100 test tubes have samples from all the hydraulic systems. The 100 tubes are then set aside to stand undisturbed for two days.

After two days have elapsed, each oil sample is rechecked to see how much dirt, if any, has been deposited on the bottom of the test tube. Although the primary purpose of the inspection is the detection of dirt, it also serves the purpose of determining the presence of contaminating liquids such as coolant, or, sometimes, even of water. Sacrilegious as it might sound, such inspection has brought to light the fact that some misguided soul, not knowing one oil from another, has put lubricating oil in the system—or, upon occasions, has filled the system with coolant!



FORGE SHOP WHEELABRATOR & DUST COLLECTOR (3-1814)

Monthly Inspection Schedule

Month of _____

	Remarks
II. Dust Collector	
(1) Check for leaky bags	OK
(2) Condition of Dustubes on dirty air side	OK
	OK

FORGE SHOP WHEELABRATOR & DUST COLLECTOR (3-1814)

Monthly Inspection Schedule

Month of February 1961

	Remarks
I. Wheelabrator	
(1) Mill door	OK
(2) Mill door liner	OK
(3) Door closing cylinder	OK
(4) Electrical panel	OK
(5) Impeller blades (replace when worn 1/8")	OK
(6) Control cage (replace when discharge lip worn back 3/8" worn about 1/4"	OK
reading sign of obstruction)	OK
(15) Skip hoist cable tension	
(16) Operation of skip bucket	
(17) Oil level in gage for sc	

Fig. 8. Schedules indicate to inspector the various items to be checked on the equipment.

Fig. 9. Machinery inspector H. White has direct contact with Works Engineer O'Hern.

Inspector and Lubrication

The inspector plays an integral part in our engineered lubrication program, a program that was installed the same time the machinery inspector was made a part of our preventive maintenance program. The inspector's part in the program is threefold:

1. On new equipment he works with the project engineer in setting up a lubrication program.

2. Once the program is set up he sees that lubrication code tags are installed at the lube points of the equipment.

3. Once each day the inspector checks the lubrication of one machine to be certain established practices are followed. In the course of a week such a check is made in each major department. This has an obvious, psychological effect on the men responsible for lubrication because they know their work is checked. (As mentioned before, we do not suffer from lack of lubrication. It appears that too good a story has been made of the importance of lubrication. Our problem is overenthusiastic lubrication. The theory of "if a little does good, then a lot will do greater good" dies hard.)

The inspector is of invaluable aid every time that new equipment is being run in for the first time. If necessary he will spend hours working with the factory representative to learn all that can be determined while the representative is on hand. Similarly, the inspector is of great help on occasions when it is found necessary to call in the factory serviceman to help us out of some special difficulty.

If, in his rounds, the inspector notices that a grinder does not distinctly show maximum wheel speed, he makes up a sign of adhesive markers and installs it in a prominent location.

From time to time the inspector follows up on certain overhaul jobs, acts as special liaison man among the maintenance, production and production control departments, and in case of emergency has even acted as a supervisor. However, these are sidelights that detract from his main task of inspector. **End**

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Circle 574 on postcard, page 33

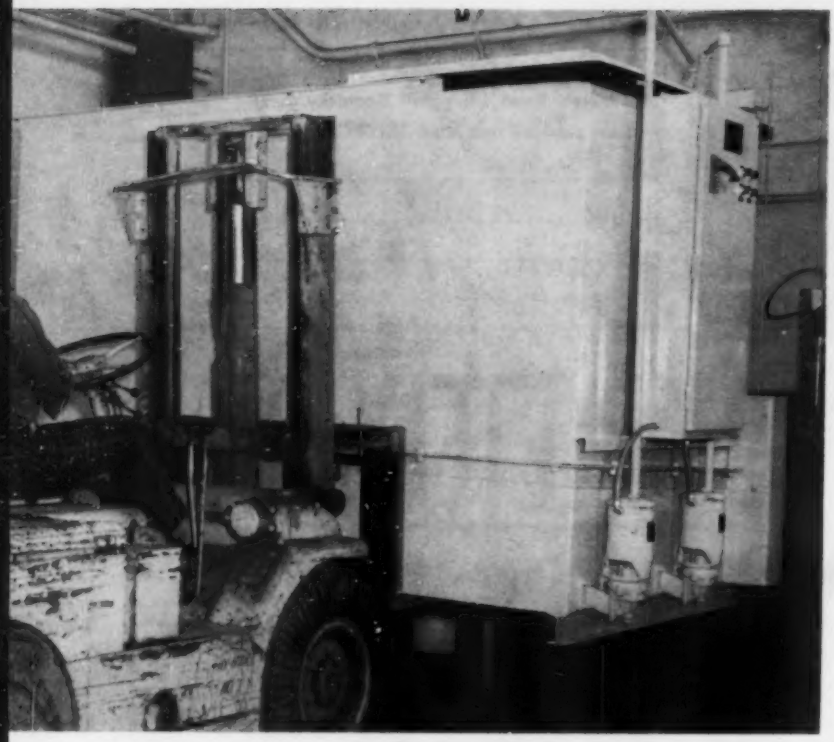


Fig. 1. Portability of waste treating units is key feature. Here, chromate treating unit is transported by fork lift truck.

PLATING WASTE DISPOSAL "PACKAGE" CUTS INVESTMENT, OPERATING COSTS

By **JOHN M. CONNELLY**, Plant Engineer
Royal McBee Corp., Springfield, Missouri

WHEN EQUIPPING our Royal portable typewriter plant at Springfield, Missouri, one problem we encountered was economical disposal of plating wastes. Our major concern was disposing of dilute cyanide and chromium rinses, in accordance with local municipal requirements. However, from time to time, we would also have to treat relatively small quantities of concentrated chemical wastes.

Plant design data indicated that cyanide content of our dilute wastes would be less than three pounds per hour and the hexavalent chromium content less than five pounds per hour. The largest volume of concentrated waste that we would have to treat at any one time would be under 600 gallons.

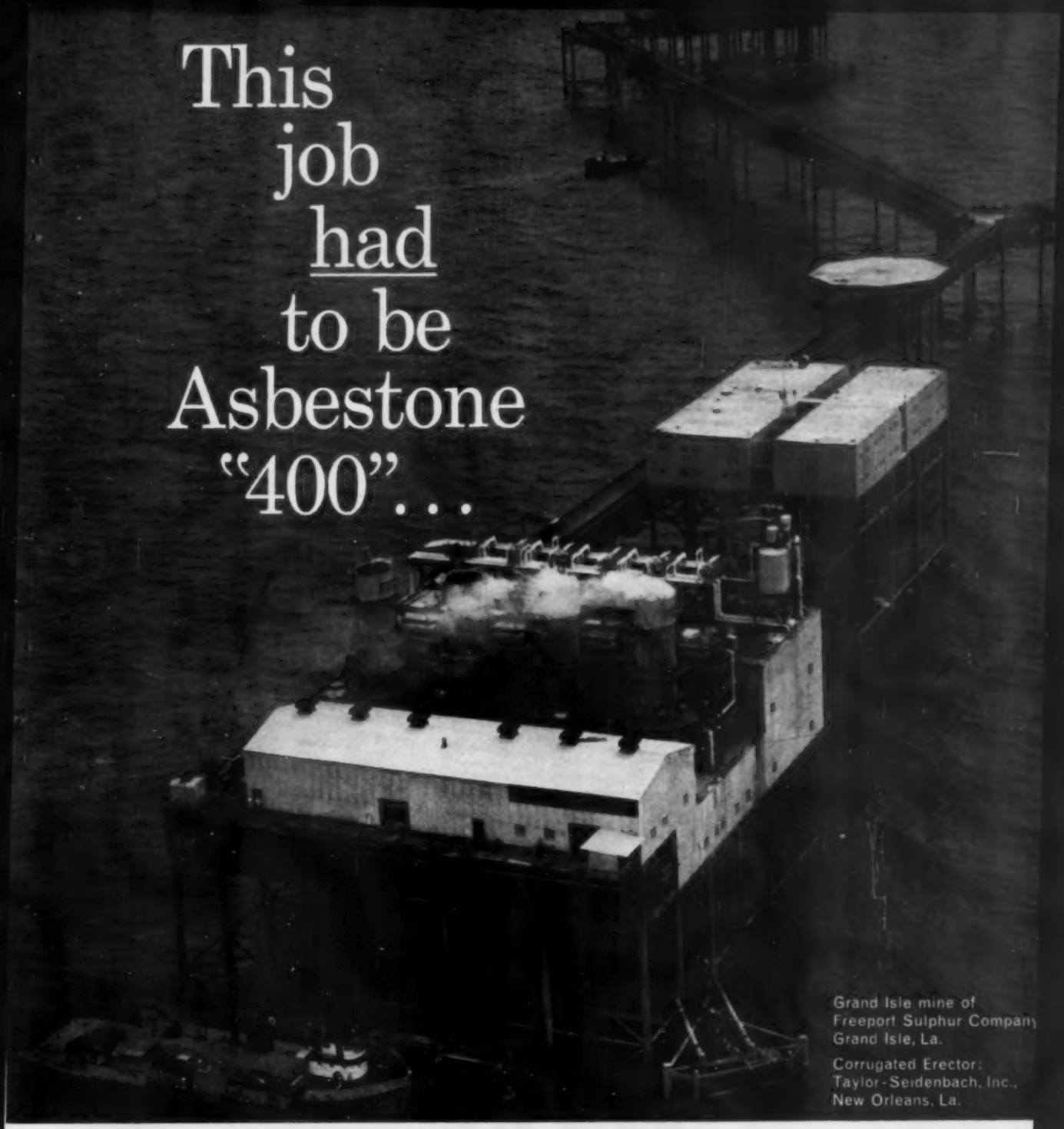
These do not represent large quantities; however, even small amounts of contaminants cannot legally be dumped into most streams or municipal sewerage systems. Water scarcity is already a problem in a number of areas; more and more city and state authorities are insisting that all toxic wastes be treated, both in the interest of water conservation, and because of the adverse effect on local treatment plants. In addition, state regulations are being made more stringent to prevent destruction of fish and wildlife in our streams and rivers, thereby preserving and restoring recreational facilities for our expanding population.

Here in Missouri, the State Water Pollution Law requires a permit for anyone to discharge waste directly into the waters of the state. Because we discharge into the municipal sewer system, we have been working with the Sanitary Engineering Division of Springfield's Public Works Department.

Knowing the types and quantities of our wastes, we consulted with these local authorities to determine their requirements. This proved to be a case where we could pipe into the municipal sewerage system, provided our treated wastes would not be detrimental to the system.

Investigation showed that conversion of cyanide to cyanate and reduction of hexavalent chrome to the trivalent form, followed by neutralization, would be sufficient. Solids content would be quite low and well within the capacity of the municipal plant to handle before allowing the wastes to pass into a stream.

Since we needed to convert the cyanide only to cyanate, we could



Grand Isle mine of Freeport Sulphur Company Grand Isle, La.

Corrugated Erector: Taylor-Seidenbach, Inc., New Orleans, La.

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The designers of the world's first off-shore sulphur mine had to plan for the corrosive effects of salt air, high humidity, sulphur fumes and occasional hurricanes. That's why buildings of this man-made island were made of Gold Bond Corrugated Asbestos-Cement. It shrugs off harmful chemical fumes, salt air and moisture, and it will not rot or burn. Always specify Gold Bond® Asbestone "400" when your buildings must resist rot, fumes and moisture. They go up fast and need little or no maintenance. Write Dept. EN-21 for complete technical literature.

NATIONAL GYPSUM COMPANY, BUFFALO 13, NEW YORK

Circle 575 on postcard, page 33

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WASTE DISPOSAL PACKAGE

have used either sodium hypochlorite or chlorine and caustic. For converting the hexavalent chrome to the innocuous trivalent form, we considered both the sulfur dioxide and the sodium bisulfite methods, together with caustic for neutralization.

Treating our concentrated wastes posed no unusual chemical problem. However, the need would arise at several different locations. Thus, if one tank were to suffice, considerable piping would be involved. The alternative would be an individual tank at each location. However, each would have to be big enough to handle the largest volume likely to require treatment at that location.

We wanted to keep plant investment cost down, but at the same time, we wanted modern efficient units whose operating costs would be as low as possible. Automatic conductivity controls on the rinse tanks were considered a must. They would not only save rinsing water, adding it only when needed, but they would also save on treating chemicals by keeping waste concentrations more uniform and thus minimizing overtreatment. In addition, because concentrations could be maintained close to treating capacities, in terms of pounds of contaminant per hour, the size of the treating tanks could be minimized, with resultant savings in first cost.

During our planning, we learned of "packaged" units which had recently become available. These solved our over-all problem, and we bought our treating plant at a cost of less than $13,000.

We got pre-piped and pre-wired cyanide and chrome treating units, complete with automatic conductivity controls and integral sumps. The units required only being set in place by a forklift truck and the installing of gravity-feed connections to the rinse tanks.

Included in the package was a 600-gallon "waste cart" constructed of quarter-inch steel plate and lined with corrosion-resistant polyvinyl chloride. Mounted on casters, it is readily moved from location to location as the need to "batch-treat" concentrated solutions arises. Its pump, driven by a 220 v single-phase motor, recirculates 20 gallons per minute to obtain good mixing of waste with the treating chemicals. All three units—a Cyanizer, a Chromator, and the waste cart, were purchased from George L. Nankervis Co., Detroit, Mich.

The cyanide unit handles up to 800 gallons per hour of rinse water and converts up to three pounds of cyanide per hour. Fresh water is fed to the rinse tank as needed to maintain a uniform cyanide concentration in the rinse wastes. These waters flow by gravity to a 300-gallon interceptor compartment, from which they are transferred to the treating compartment by one of two float-controlled pumps which operate alternately.

Sodium hypochlorite solution is drawn directly from a commercial drum by a feeder pump and injected into the rinse waste at a mixing lateral. Using commercial hypochlorite having an available chlorine content of 15-16 per cent, the feed pump adds it at a rate of three gallons per pound of cyanide.

Tank Baffles Direct Flow

The treating compartment is specially baffled to prevent short-circuiting of the liquids and to insure adequate retention time (one hour). Solids settle to the bottom, from where they can be removed periodically through ports provided for that purpose. The converted effluent passes over a weir and flows by gravity to the sewer.

Operating cost depends on the price of commercial sodium hypochlorite solution. Theoretically, 2.1 gallons of the solution (providing 2.73 pounds of available chlorine) should suffice for one pound of cyanide. How-

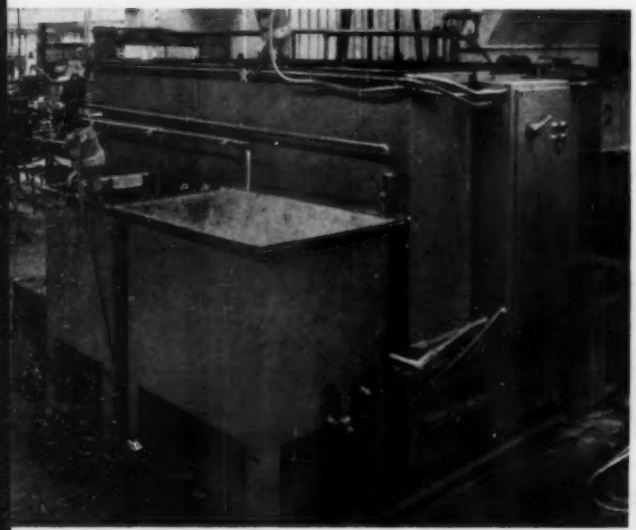


Fig. 2. Chromate treating unit in place. Cnemicals mixed in tanks in foreground are pumped into treatment tank. Controls adjust to conductivity readings, float positions.

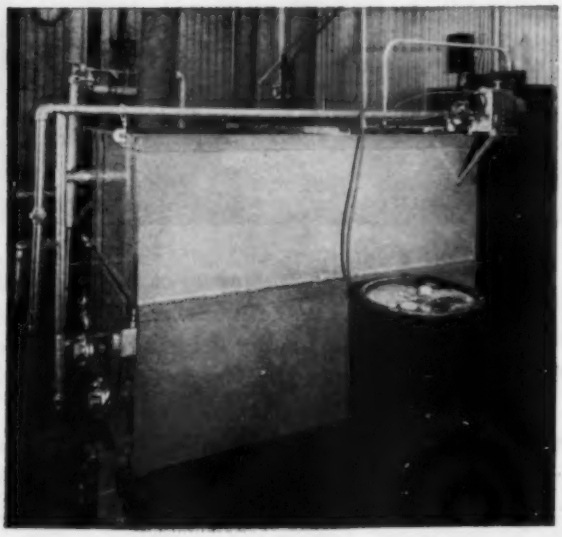
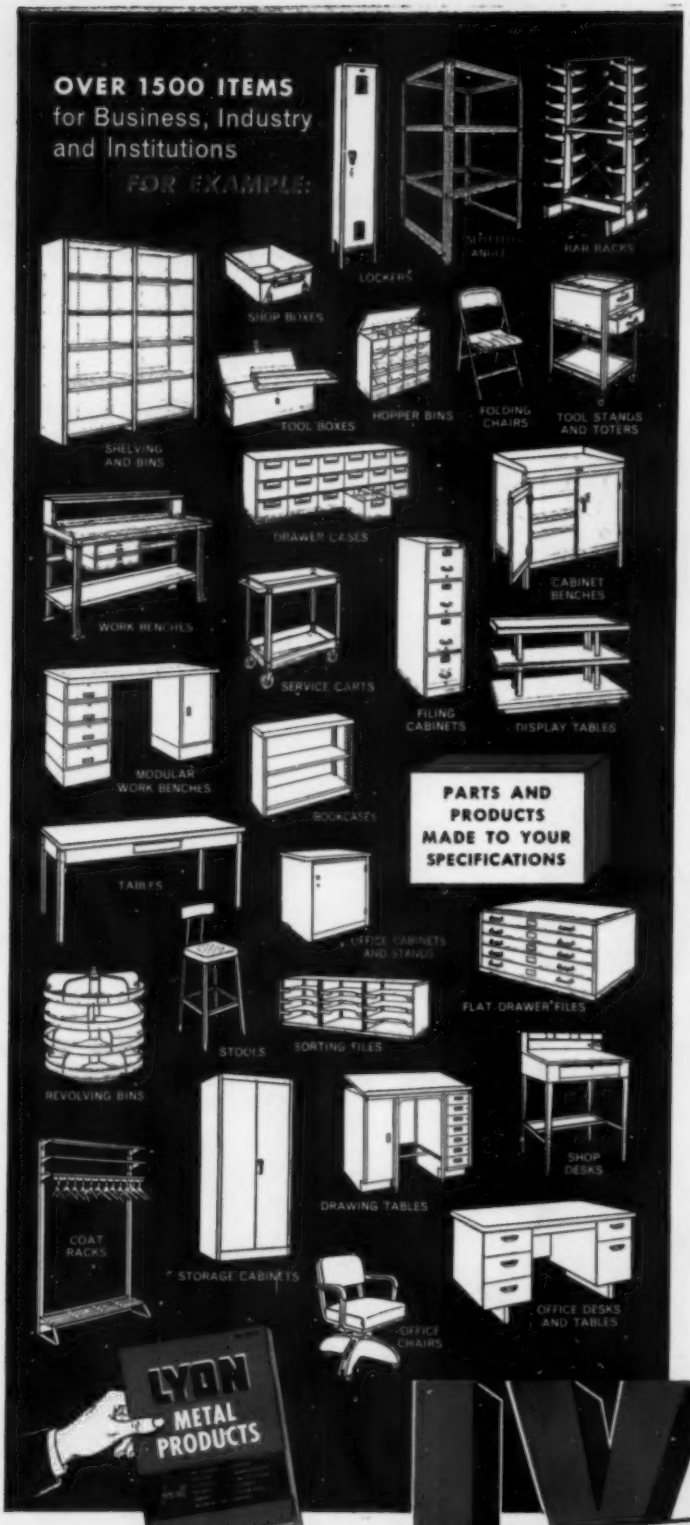
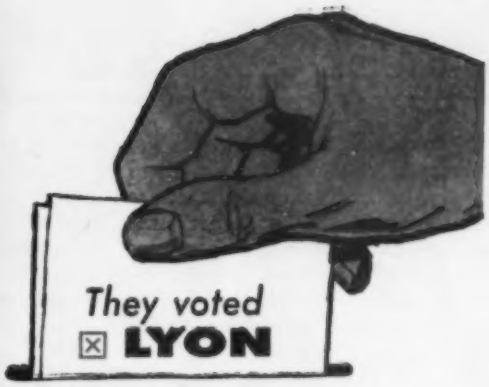


Fig. 3. To treat cyanide wastes, sodium hypochlorite is fed from drum into the treating tank compartments.



THIS CATALOG ILLUSTRATES THE WORLD'S MOST DIVERSIFIED LINE OF STEEL EQUIPMENT *IT'S FREE!*



5 TO 1

"If your company were in the market for steel equipment such as steel shelving, lockers, work benches, shop boxes, etc., what manufacturers would you consider?"

That was the question an independent survey organization put to key men in companies throughout the country back in 1955. They gave Lyon 5 times more first choice votes than any other manufacturer.

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LYON® METAL PRODUCTS

Circle 576 on postcard, page 33

ever, side reactions and deviations from ideal conditions make it wise to use three gallons. Thus, hypochlorite cost per pound of cyanide converted to cyanate ranges from 75 cents with hypochlorite at 25 cents per gallon to 99 cents when the treating solution costs 33 cents per gallon.

Our chrome unit handles up to 600 gallons per hour of rinse water and converts up to five pounds of hexavalent chrome hourly to the trivalent form. The features of conductivity control of fresh water and gravity-flow to the interceptor compartment are similar to those of the cyanide unit, as is transfer of the wastes to the treating compartment.

The required treating chemicals, in our case sodium metabisulfite and sulfuric acid, are metered into the waste at a constant rate which can be changed to suit conditions.

Retention time for reduction of hexavalent chrome is one-half hour, following which caustic (sodium hydroxide) is added to neutralize the solution to a pH of 7 to 8.5. A mixer insures good contact of the reactants. Settling time for the resulting sludge is about two hours. The effluent then flows over a weir to the sewer.

Once again, operating cost depends on the price of the treating chemicals. The amounts required are as follows: 3 lb of sodium metabisulfite per pound of chrome; 4 lb of sulfuric acid per 1000 gallons of solution; and 3.5 lb of caustic per pound of chrome. The treating chemicals cost 24, 18 and 21 cents, respectively, per pound of chrome treated. Therefore, total cost of treating chemicals is 63 cents per pound of chrome.

Fig. 4. Top view of chromate-treating tank shows baffle arrangement to guide flow of wastes and treating chemicals through tank.

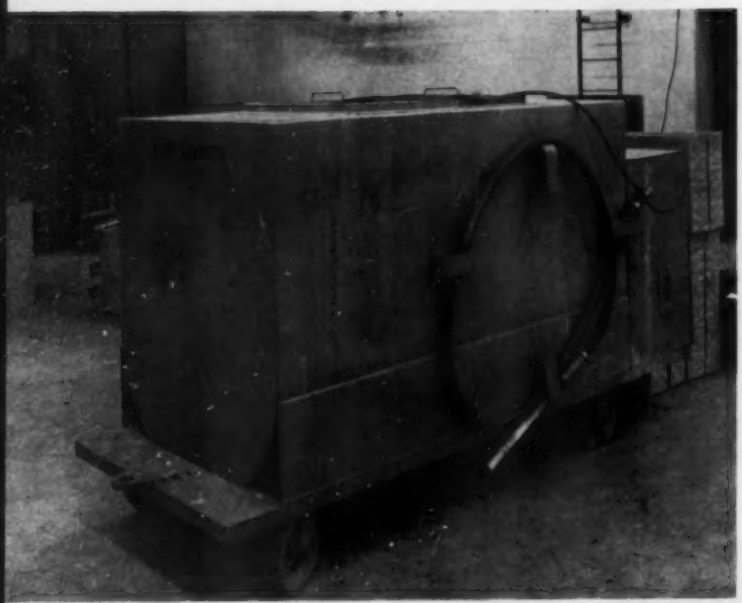


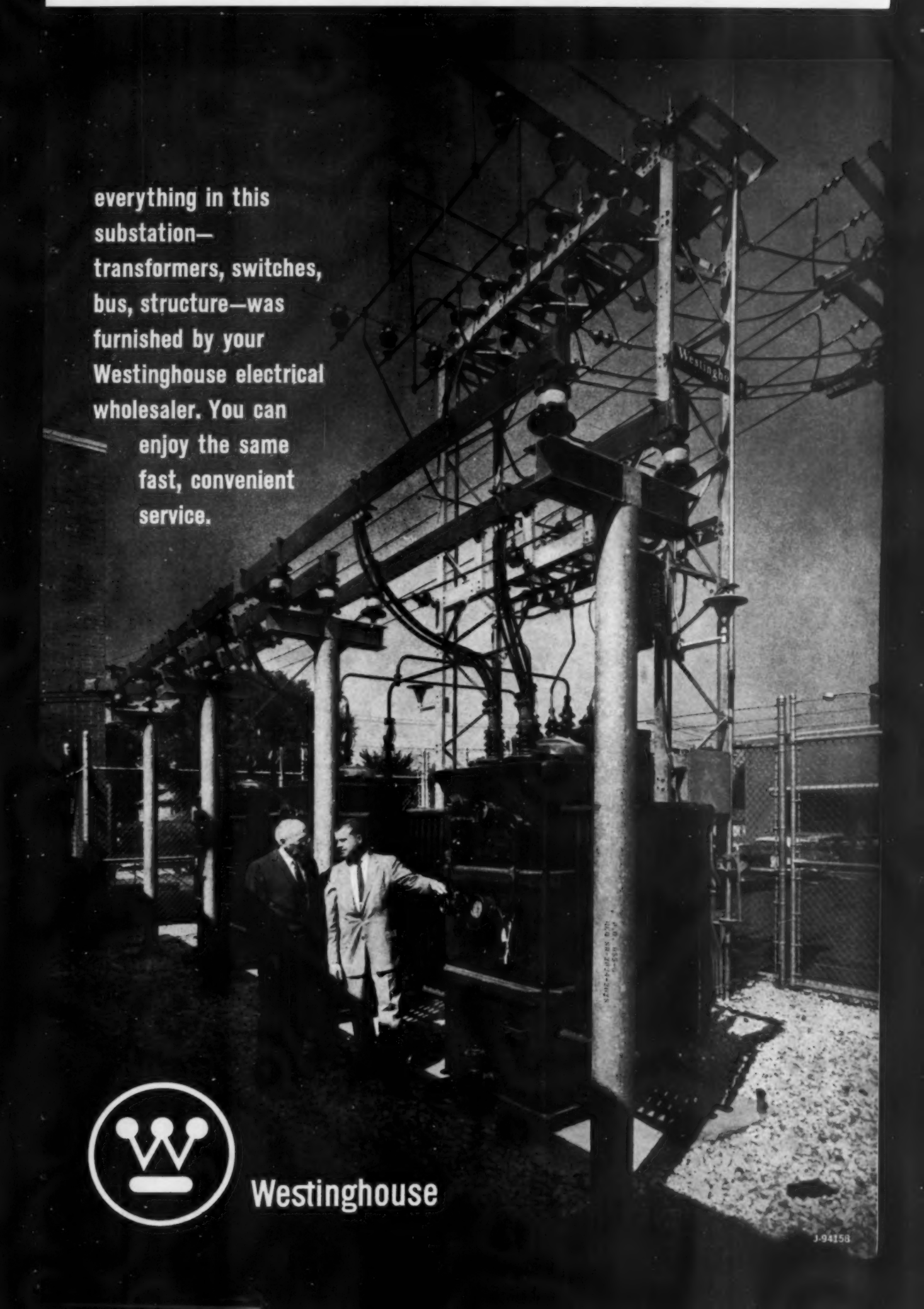
Fig. 5. Caster-mounted treatment tank, lined with PVC, can be relocated to treat batches of concentrated wastes as needed.

Units Do Our Job Well

Based on over a year's operating experience, we feel that our purchase of packaged waste disposal units was an excellent decision. The first cost was much lower than that for self-designed or custom-built equipment. Installation cost and effort were practically nil; relocating the units will be almost effortless.

The treating processes use conventional low-cost chemicals, and the conductivity controls on the units minimize consumption of both fresh water and treating chemicals. One portable waste cart takes care of all our concentrated wastes, thereby eliminating the need for multiple treating tanks or complicated piping to a centralized tank.

On the basis of our experience, we believe packaged units may provide the answer to the waste-disposal problems of many small plating plants. In addition, such units should find numerous applications in large plants, where spot treating of wastes at the source could eliminate long and intricate runs of pipe. **End**


everything in this substation— transformers, switches, bus, structure—was furnished by your Westinghouse electrical wholesaler. You can enjoy the same fast, convenient service.
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World's Largest Self-Contained Hydraulic Press Brake

THE MOST POWERFUL metal-bending machine of its type ever built has been installed by Harnischfeger Corp. of Milwaukee. With the touch of a button, the monster delivers a whopping 2000 tons of pressure—enough to shape sections of super-strength alloy steel measuring 26 ft wide and 1¼ in. thick—and does it with no strain.

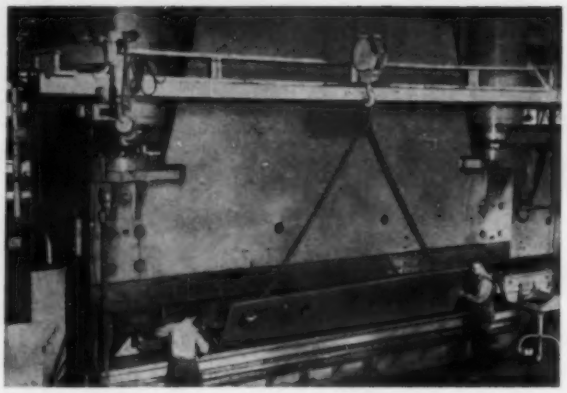
Some idea of the size and complexity of the machine is in the fact that 1000 gal of fluid are required to fill its hydraulic system. The machine covers more than 350 sq ft of floor area, rests in a pit 11 ft below the floor, extends more than 21 ft into the air, and tips the scales at a half-million pounds.

This new $150,000 press can perform in one bending operation many of the same jobs previously requiring as many as five strokes with conventional machines; and equally important, the new press is permitting increased use of higher grades of alloy steels than normally would be practical from a production standpoint.

The Harnischfeger firm is now using the press on a full two-shift basis. It is shaping trolley sections for overhead cranes, excavator dipper sticks, bucket shells, cable drums, cab base frames, and other components for widely diversified products.

The press, the largest of its kind ever built, has a 24-in. stroke, a bed 26 ft long by 2½ ft wide, operates at high pressure up to 3000 psi, and uses a 200-hp electric motor to drive the hydraulic pumps. It requires only one operator and helper.

A complex control system permits selection of four different pressing speeds in increments of from 5 to 24 ipm, depending upon whether the press is being used for punching, medium forming, or heavy forming. There is a fast



advance speed of 180 ipm, and also a fast return speed of 135 ipm.

An important automatic governing control in the hydraulic system constantly maintains the ram in a level position. If one cylinder lags, the system automatically bleeds oil from the lead cylinder and feeds the lagging cylinder.

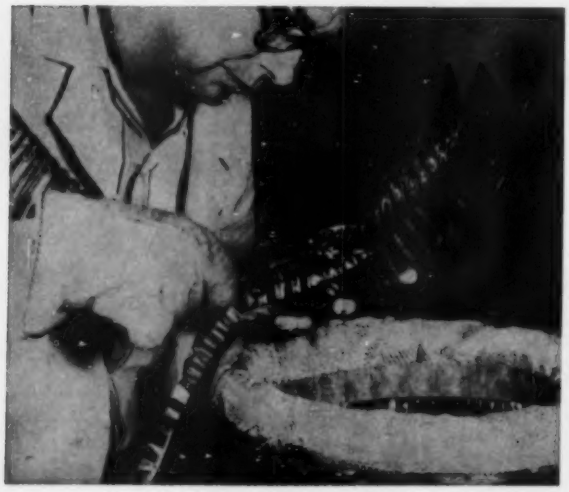
A method of tilting the ram also has been provided for use in forming conical shapes. A simple handwheel adjustment sets the required angle of tilt.

Assembly of the sections, some of which weighed more than 50 tons, required special techniques and equipment. One innovation was a specially designed "midget" boom for our big crawler crane, necessitated by it having to operate indoors under building truss sections.

Casting of Epoxy Resin Joins With Stainless Steel Foil to Fight Corrosion

AN INGENIOUS APPROACH reported by American Iron & Steel Institute for protecting equipment against corrosion now largely eliminates cost of materials as a major consideration. The end result is a massively thick layer of inert material, compared with electroplated surfaces, imparting to the entire equipment surface the character of stainless steel.

The process uses stainless steel foil as the mold for a casting of epoxy resin. The product being protected is embedded inside the resin, protected from mechanical injury and the surrounding environment. The resin provides mechanical support, while the stainless foil protects against corrosion.



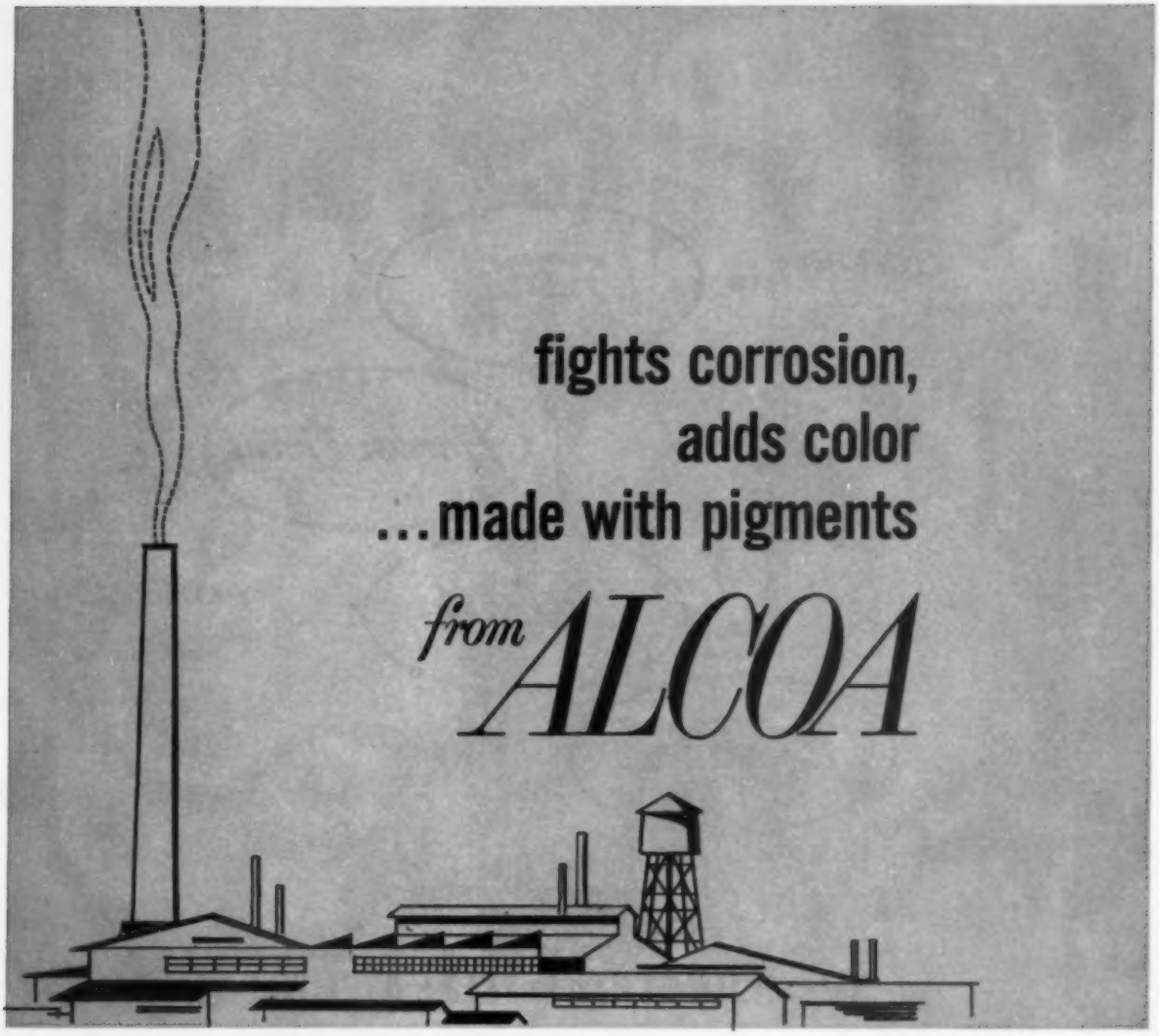
Essentially, the process adapts the electronic industry's encapsulating technique for "potting" electronic components. The Epoxylite Corporation, El Monte, California, developed this process which protects the magnetic wire of the motor against moisture, dirt, and attack by some chemicals.

This new process uses 0.0021 in. thick stainless steel foil as the molds. After molding, the stainless remains in place. It is therefore completely sealed in a thin, lightweight envelope of stainless which extends over the windings and through the motor bore.

Epoxylite claims its encapsulation technique, with stainless foil, gives properly designed motors complete insulation (even in contact with Freon gas) under total immersion and under the most severe environments.

Non-magnetic stainless steel avoids distortion of the motor's magnetic flux, increasing operating efficiency. Foil is spaced from the windings by glass cloth and by the epoxy resin, both insulators. The stainless sheath can be positioned a few thousandths of an inch from the current-bearing copper, without danger of a short circuit.

Stainless encapsulated motors offer no unusual maintenance problems, cost no more than those embedded in epoxy alone, and are priced between 5 and 15 per cent over unprotected motors.



Subox develops new colored aluminum coating

Subox, Inc., Hackensack, N.J., famous for rust-inhibitive industrial coatings since 1924, announces a new aluminum paint in color. Called *Subalox Anodine* and available in four tones—metallic blue, green, beige and bronze—the new colored finish combines suboxide-of-lead with polished aluminum flakes to form a one-coat, rust-retardant paint. Bonds to weathered galvanizing—reinforces old paint coats—adds durability and chemical resistance to new primers.

Made with Alcoa® Pigments, paints like *Subalox Anodine* are ideal for coating water towers, tanks, piping, utility structures, fences, bridges and stacks heated up to 200°F. The soft, decorative finish does not readily show dirt or fume discoloration. One coat protects for years. Look at your plant today. Asset or eyesore? A good colored aluminum coating may be the stitch-in-time investment that pays off in better plant protection—better public relations.

ALCOA ALUMINUM

PIGMENTS, PASTES & POWDERS

Alcoa does not make paint, but Alcoa Pigments are used in more aluminum paints than any other brand. Special formulas have been developed by paint manufacturers like Subox, Inc., to solve individual problems. Paints made to these formulas actually cost less, last longer, give utmost protection against heat, cold, sun, rain, smoke and fumes. Send the coupon today for our booklets about all types of aluminum paints and coatings.

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PLANTS IN MELROSE, MASSACHUSETTS AND LEBANON, INDIANA

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Circle 579 on postcard, page 33 ➔

So gentle it won't chip china, yet powerful enough to bend steel tubing as if it were a soda straw. In a nutshell, this demonstrates the almost unbelievable degree of control built into Logan air-draulic devices.

The controlled accuracy gives this equipment a versatility and flexibility that makes it adaptable to all kinds of jobs, ranging from precision laboratory assignments to actual production line work.

If you would like additional information about air-draulic devices or other Logan products, merely fill in the coupon below.

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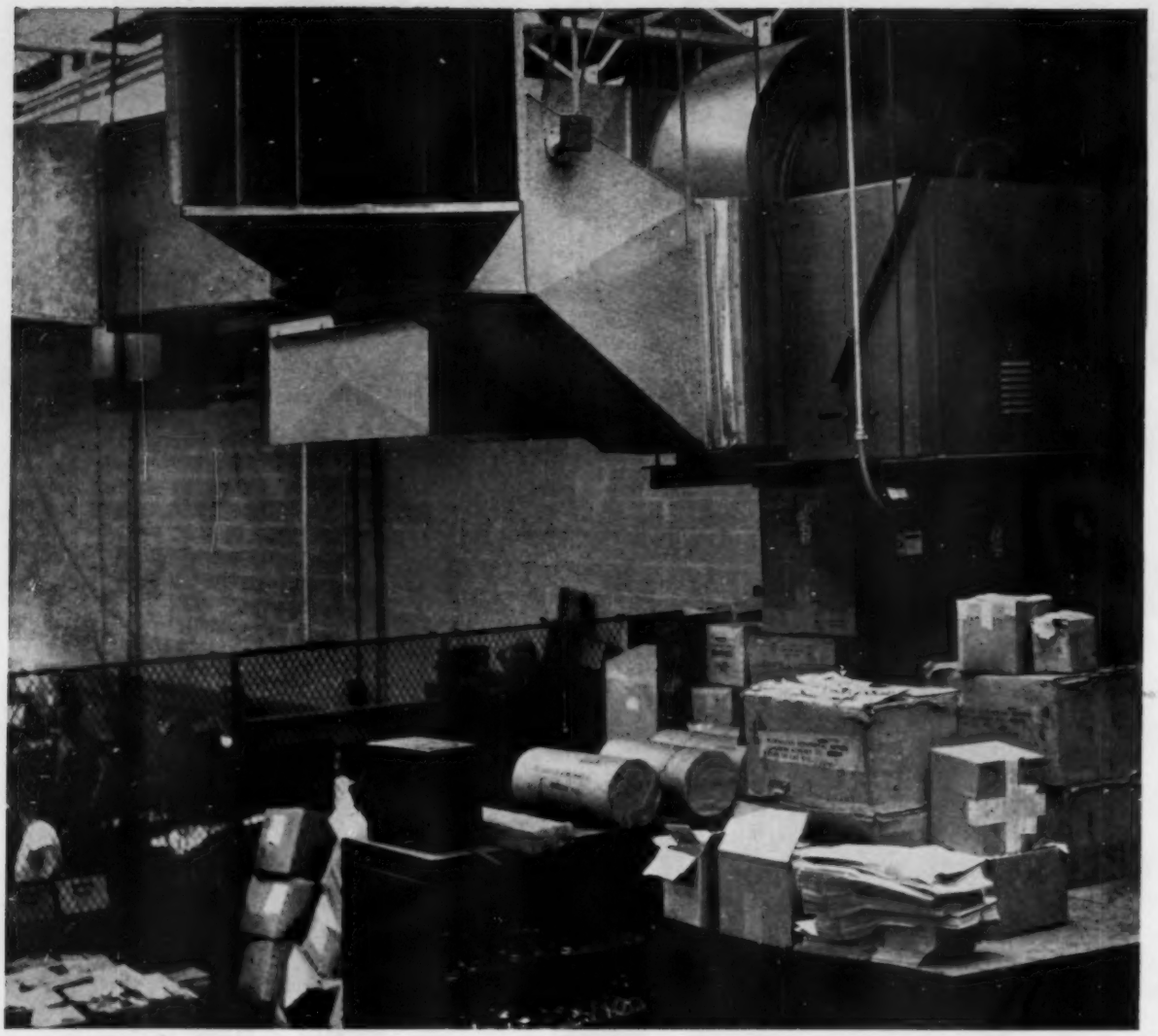
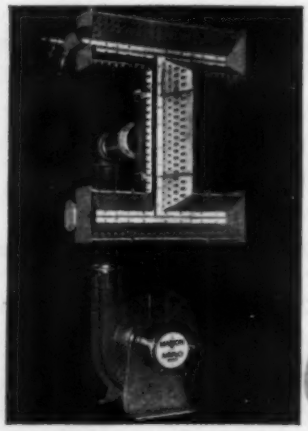


This gas-fired make-up air heater, equipped with Maxon burners, replaces exhausted air in the plant of Kiekhaefer Corporation, makers of "Mercury" outboard motors.

Cure plant air starvation with make-up air heated by GAS-fired MAXON burners

Many plants become starved for air when their exhaust systems remove air faster than it is replaced. This was the problem at Kiekhaefer Corporation of Oshkosh, Wisconsin, before they installed a gas-fired make-up air heater, equipped with Maxon AIRFLO Line Burners.

The entire plant had been under negative pressure, created by suction of exhausters at many grinding operations. This pulled downdrafts in unit heater vent flues. Workers complained of watery eyes and headaches. Condensation dripped on material. Heat loss was excessive. Maintenance cost on unit heaters became prohibitive.



Designed expressly for make-up air heating, the Maxon AIRFLO Line Burner and Mixer provide complete, odor-free combustion over very wide ranges of turn-down. They are standard equipment in many packaged heaters, and are highly recommended for heating the replacement air for paint spray booths in finishing lines.

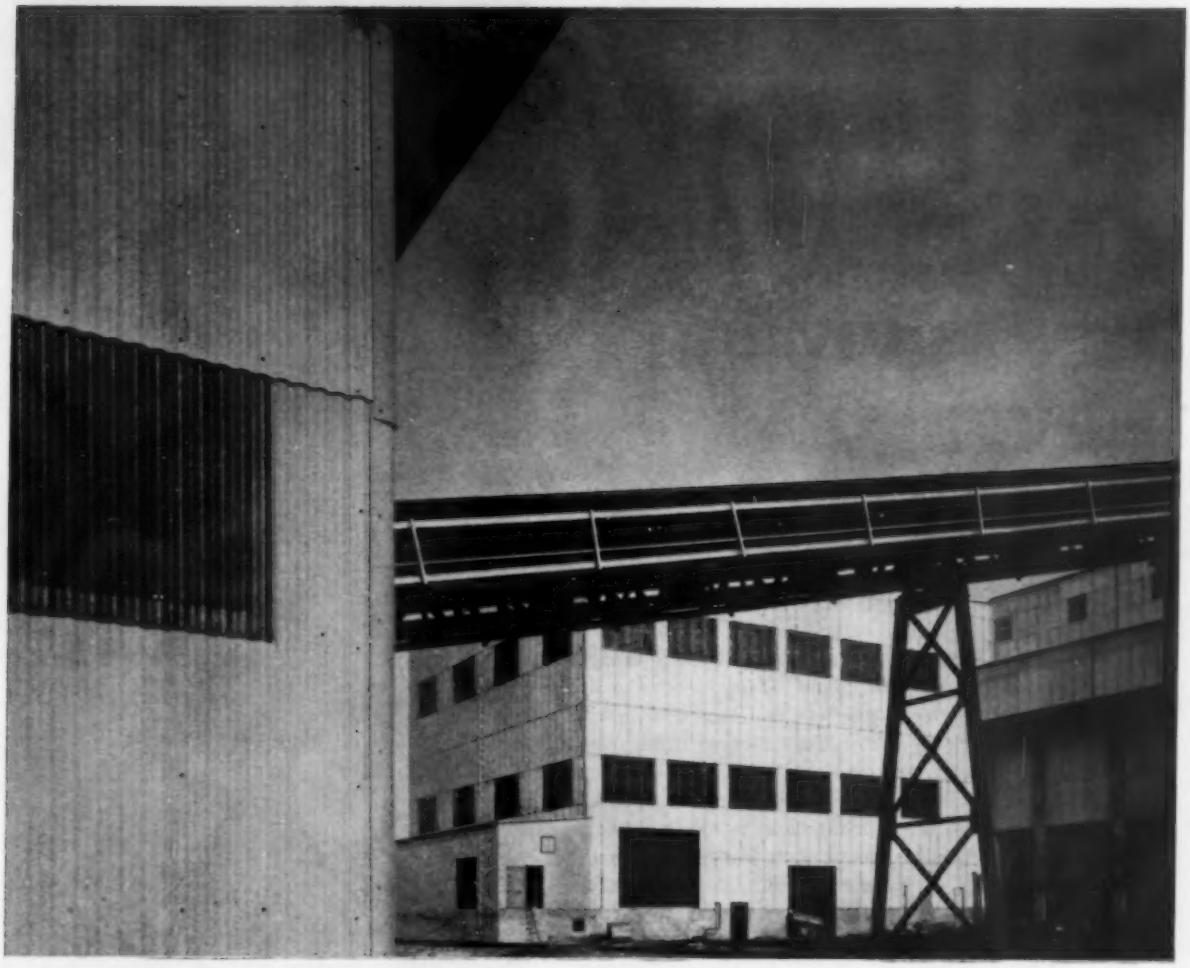
Replacement air, heated by gas-fired Maxon Burners, solved all these problems at minimum cost. In fact, initial cost of this make-up air heater was quickly amortized on reduced maintenance and savings on fuel costs. The plant enjoys all the advantages of modern gas heat: high efficiency, precise control, speed, cleanliness, economy and dependability.

For information on heating make-up air with gas-fired Maxon burners, call your local Gas Company. Or write to Maxon Premix Burner Company, Incorporated, Muncie, Indiana.

American Gas Association

FOR HEATING MAKE-UP AIR GAS IS GOOD BUSINESS!

Circle 580 on postcard, page 33



Better light at lower cost because **J-M CORRULUX®** *provides*

SHATTERPROOF DAYLIGHTING

J-M CORRULUX IS an economically-priced, translucent building panel manufactured by Johns-Manville. It is made of weather-resistant, light-stabilized resins reinforced with high strength Johns-Manville fiber glass. Corrulux panels are noted for their shatterproof strength, resistance to industrial fumes, easy installation, long life and exceptional light admission.

J-M CORRULUX HELPS INCREASE EFFICIENCY. Although Corrulux admits up to 80% of the light striking it, the light is diffused. There is no glare to cause worker eyestrain. Transmission of sun heat is also reduced—a boon on hot summer days. A soft green color was chosen for the plant above. But there are 17 other colors, with varying light transmission qualities, for you to choose from.

J-M CORRULUX WORKS EASILY, CUTS COSTS. Exterior framing can be eliminated (see panel at left of photograph) because Corrulux panels handle as easily as the panels of J-M Corrugated Transite® which are used for the exterior walls of this plant. And when framing *is* required, Corrulux reduces it to a low-cost minimum. Corrulux can be sawed and drilled . . . bolted or nailed. Corrulux is also available in flat panes, which end window breakage problems forever when glass panes are replaced with shatterproof Corrulux Flat Panes.

WHERE YOU CAN GET CORRULUX. Three weights of Corrulux are available: Functional, Structural and Heavy Structural. For more details, look in the Yellow Pages under *Plastics*, or write to Johns-Manville, Box 158, Dept. PE-9, New York 16, N. Y. In Canada, address Plastics and Allied Products, Ltd., Dundas, Ont.

JOHNS-MANVILLE

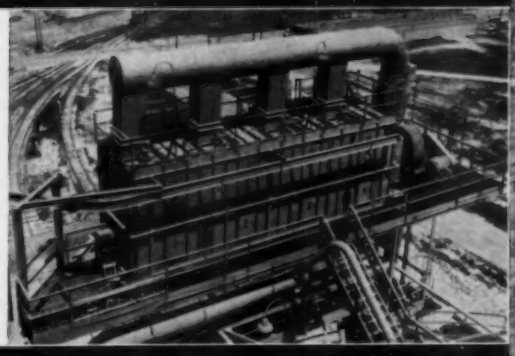
Circle 581 on postcard, page 33

is your company's progr showing?

Not too many years ago, smoke clouds over a plant meant prosperity. Today, with the flood of public opinion against dirty air, such a sign has other connotations: (1) the plant is out-of-date; (2) the plant is probably inefficient and wasteful; (3) the owners are postponing their civic duties.

Nowadays, *clean* stacks are a sign of good management and an up-to-date plant. Many companies are keeping stacks clean by collecting dust and fume with a Dracco Dust Control system. Dracco installations use cloth filter bags—made from fiber glass, natural or synthetic fabrics—to provide high-efficiency collection of all visible particles. Each system is custom-engineered to a particular plant layout, and to the characteristics of the dust or fume to be collected. Nuisance dusts can be controlled and discarded . . . valuable dusts can be returned to process.

Take a look at your sky. If dirty air is one of your by-products, call a halt by calling Dracco Division of Fuller Company, Harvard Avenue and East 116th Street, Cleveland 5, Ohio.



The use of glass cloth extends the application of Dracco bag-type filters to temperatures as high as 600°F., and sonic cleaning reduces maintenance costs. Higher temperatures are possible with auxiliary cooling. Dracco cloth filtration provides highest efficiency collection of dust particles even in the sub-micron range.

DRACCO *airstream c*
dust control

FULLER COMPANY GENERAL

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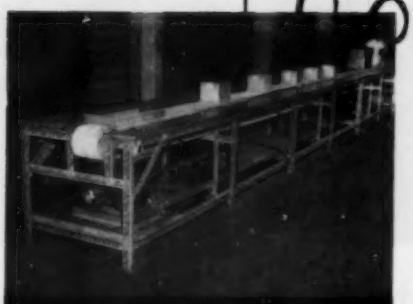
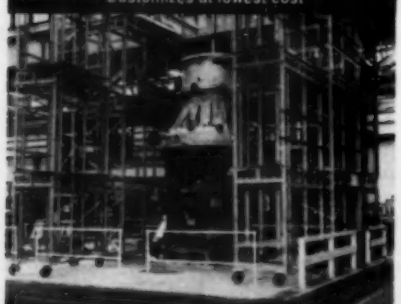
Circle 583 on postcard, page 33 →

HOW TO TIGHTEN UP ON FRAMING COSTS



Customizes at lowest cost



Simplifies complicated jobs

Also in "ready-to-assemble" kits

Acme Steel's AIM Brand Slotted Angle frames anything faster, easier, stronger . . . at less cost

Bring on any framing job—platforms, ladders, steps, work tables, benches, stands, conveyors, storage racks . . . even complete staging areas. Acme Steel Slotted Angle will tackle them all . . . complete them all with amazing speed, ease and material savings.

Simplicity is the secret. This rugged, galvanized steel do-all material is simply sheared to size with an AIM Brand Cutter and bolted together. The cutter and a wrench are the only tools needed. No drilling, sawing or welding. And Acme Steel's exclusive pattern of precision slots and holes aligns perfectly with opposite members. There's no figuring and finagling to fit pieces. Your men can master assembly in minutes. Obviously, manpower savings are tremendous.

AIM Brand's superior bolting pattern also gives you virtually unlimited design freedom, plus unparalleled structural rigidity.

All factors considered—initial cost, assembly savings, design versatility and 100% reusability potential—you'll come out way ahead with Acme Steel Slotted Angle.

NOW IN CONVENIENT "PRE-CUT" KITS. New AIM Brand Slotted Angle Kits offer over 250 types and sizes of storage units, die, sheet and bar stock racks, desks, tables, benches and carts. Nuts, bolts, accessories, instructions included. Send for facts.

ACME STEEL IDEA LEADER IN FRAMING

ACME STEEL COMPANY, Fabricated Materials Division,
Dept. PES-91, 135th St. & Perry Ave., Chicago 27, Ill.

- ☐ Send new idea booklet on slotted angle.
- ☐ Send facts on new slotted angle kits.
- ☐ Send name of my nearest AIM Brand distributor.

Name _____

Title _____

Firm _____

Address _____

City _____ *Zone* _____ *State* _____

CAUGHT IN THE ACT
of making a costly mistake

don't waste money repairing old unit heaters
replace with new Modines!

MODINE STEAM AND HOT WATER UNIT HEATERS — Horizontal, vertical and Power-Throw® types . . . in a wide range of sizes.

MODINE GAS-FIRED UNIT HEATERS — Propeller units (shown) are attractive, lightweight. Eight sizes—25,000 to 310,000 Btu. Gas-fired blower units are available in seven models from 50,000 to 310,000 Btu.

We caught this man with his heater down! He should have taken this tip from Modine: when a 10- to 15-year old unit heater starts to leak, it's almost a sure sign useful life is over. One leak usually leads to another, making repairs a gamble.

Don't throw good money after bad. Instead, replace your old units with new Modines. On the Modine-Plan for replacement, you eliminate the danger of production interruptions due to unexpected heating failures. You avoid the expense of frequent, ineffective repairs. And you get the *finest;* new Modines heat better, use less fuel, run quieter, require only routine maintenance.

For full details on the Modine-Plan for replacement, contact your qualified heating contractor or your nearest Modine representative. Or write Modine Manufacturing Co., 1563 DeKoven Ave., Racine, Wis. SU-1444

Modine®
MANUFACTURING COMPANY

In Canada: Sarco Canada, Ltd., Toronto, Ont.

Circle 584 on postcard, page 33

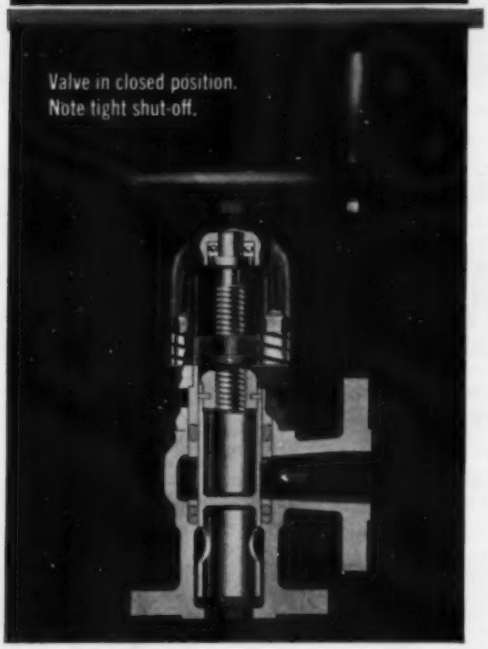
YARWAY news briefs

from **Yarnall-Waring Company,** *Philadelphia 18, Pa.*

BRANCH OFFICES IN 19 UNITED STATES CITIES • SALES REPRESENTATIVES THROUGHOUT THE WORLD
STEAM TRAPS STOCKED AND SOLD BY 270 LOCAL INDUSTRIAL DISTRIBUTORS

WHY OVER 16,000 ENGINEERS CHOOSE AND USE YARWAY SEATLESS BLOW-OFF VALVES

Yarway Seatless Blow-Off Valve in open position. Note full, free discharge.



Valve in closed position. Note tight shut-off.

SAVING IN MAINTENANCE COSTS
FREEDOM FROM BOILER OUTAGES

These are the reasons—proved again and again in thousands of installations over the last 50 years, as *Yarway Seatless* has become virtually "standard" on low to medium pressure boilers.

Check these features that earn such acceptance for this time-honored but truly modern, compact valve:

■ **UNIQUE SEATLESS DESIGN**—full free discharge... combined with drop-tight shutoff... and no seat to score, wear, clog or leak.

■ **BALANCED HOLLOW SLIDING PLUNGER**—made of nitralloy with a "glass hard" surface that resists erosion, high temperatures and sudden shocks. "Polishing" action lengthens life of packing rings.

■ **COMPRESSON YOKE SPRINGS**—heavy coil springs under yoke nuts maintain continuous pressure on reinforced packing above and below valve port to keep valve tight.

■ **BALL BEARING HANDWHEEL**—for smooth operation, easy opening and closing.

■ **NON-RISING STEM.** Valve cannot be opened or closed too quickly. Water hammer is prevented.

■ **STREAMLINED BODY AND YOKE.** Strength where strength is needed—without unnecessary bulk.

■ **CHOICE OF FIVE SIZES—1″ to 2½″,** angle or straightway designs, flanged or screwed ends, available in any tandem combination.

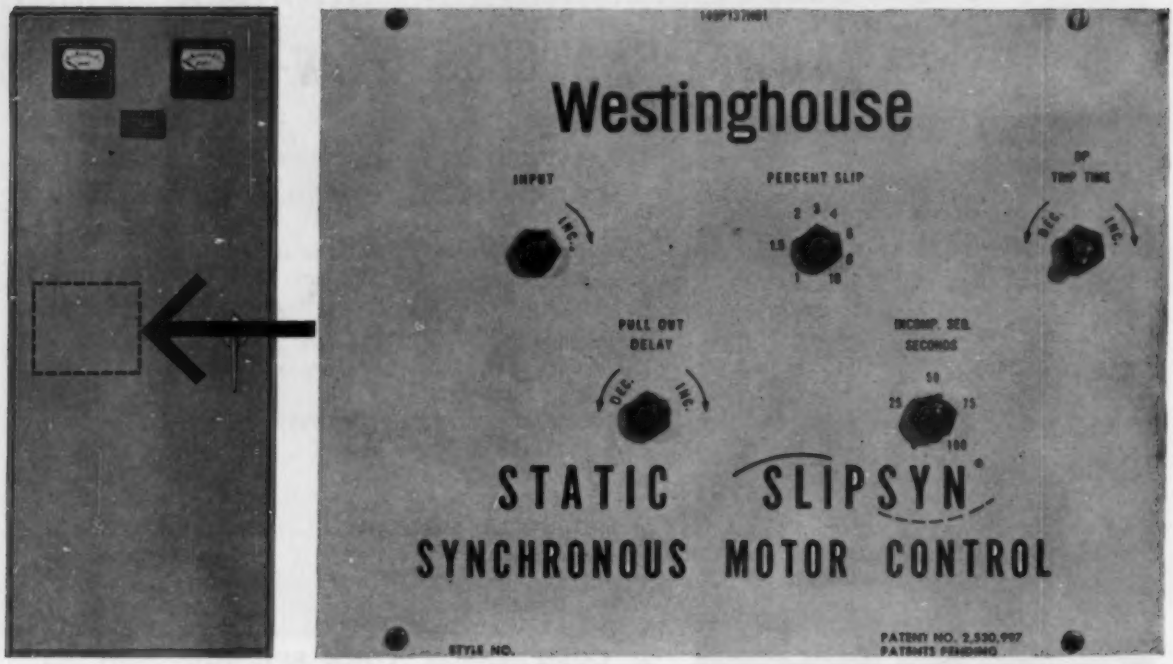
If you are planning purchase of a new boiler, or modernization of present boilers in pressure ranges up to 415 psi, *insist* on protecting your investment with new Yarway Seatless Blow-Off Valves.

They'll give you maximum dependability, minimum maintenance, and satisfaction that is beyond price—all at a very *low* cost per year.

Write for Yarway Bulletin B-427.

Circle 585 on postcard, page 33

Now... Westinghouse Static Slipsyn* Control includes 3 more static protective features for synchronous motors



1. **STATIC DAMPER WINDING NETWORK** protects synchronous motors against damage by locked rotor or excessively-long starting conditions. This circuit may be quickly and easily added to your present static units.

2. **STATIC FIELD LOSS NETWORK** protects motors against abnormal conditions resulting from loss of d-c excitation.

3. **STATIC INCOMPLETE SEQUENCE NETWORK** protects the motor in case it fails to sequence properly during start up.

These features, added to the basic Westinghouse exclusive Static Slipsyn control make Static Slipsyn more than ever, the best control available. Its advantages:

Most accurate synchronization system available—accuracy up to 99% of synchronous speeds — not affected by machine vibrations.

Adjustable pull-out protection—eliminates nuisance tripping due to transient conditions — easily adjusts from the front — can be set to re-synchronize or shutdown on actual pullout.

No maintenance — completely static transistorized synchronizing system — uses no moving parts — components are impervious to humid, corrosive or dirty atmospheres — there are no relays to burn, pit, inspect or repair.

Applicable to all synchronous motor starters—same sized package for all applications — for both high and low voltage — whether for new motor installation or for relay replacement.

For additional information on the advantages of Static Slipsyn Control for synchronous motors in *all* manufacturing operations, call your local Westinghouse sales engineer or write to: Westinghouse Electric Corporation, General Purpose Control Department, P.O. Box 2025, Buffalo 5, New York.

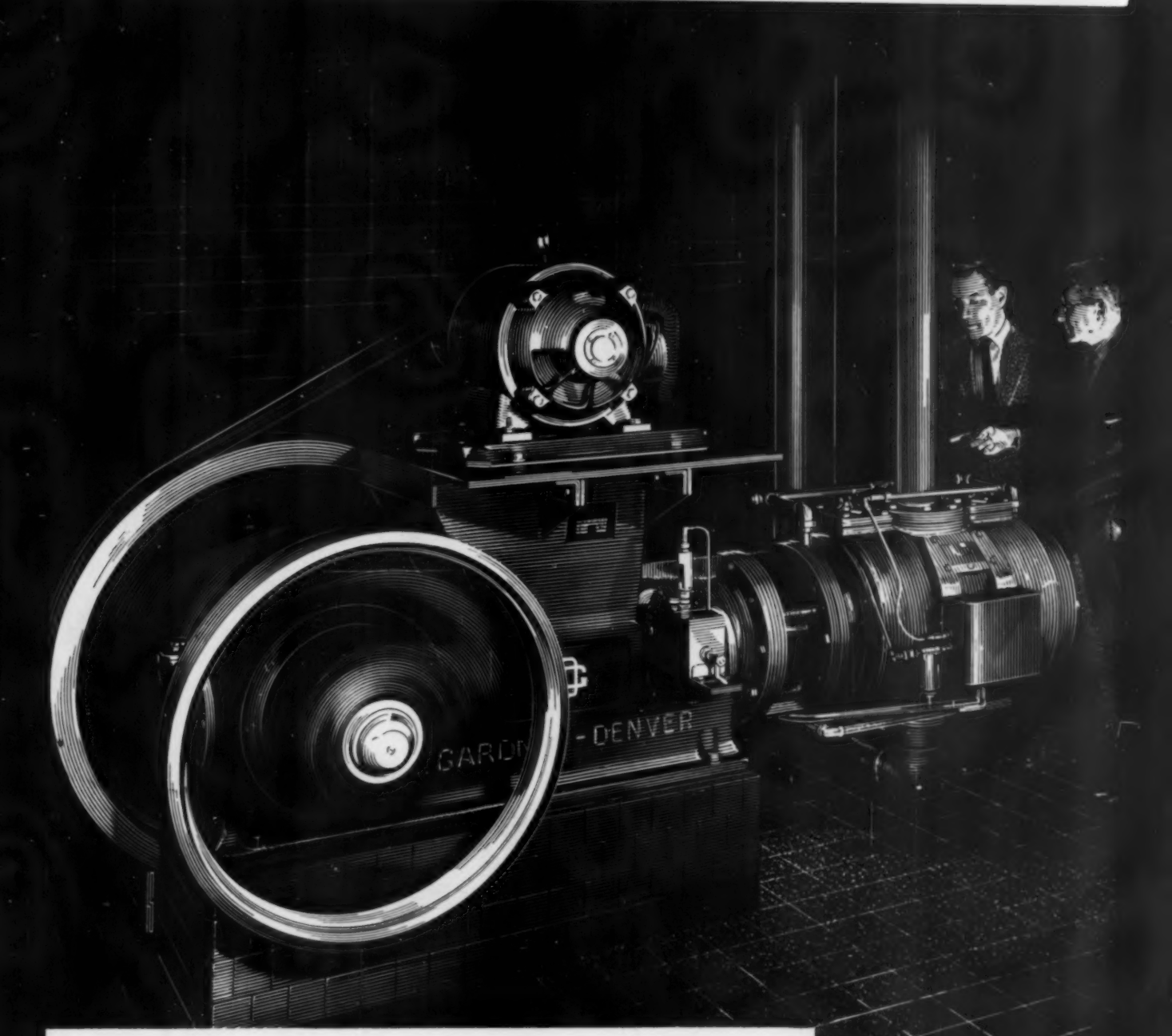
You can be sure...if it's **Westinghouse**

*Trademark

J-28011

Circle 586 on postcard, page 33

Circle 587 on postcard, page 33 →



"No more oil to spoil our quality"

. . . the reaction to Gardner-Denver oil-free compressors. They protect product quality by delivering pure, clean air—air that never has a drop of oil in it. So if even a trace of oil in your air line is too much, see Gardner-Denver first. Write for bulletin CRC-10.

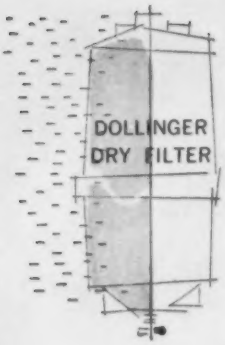
Gardner-Denver Company, Quincy, Illinois—Offices in principal U.S., Canadian and Mexican cities
In Canada: Gardner-Denver Company (Canada), Ltd., 14 Curity Ave., Toronto 16, Ontario

International: Gardner-Denver International Division, 233 Broadway, New York 7, N.Y.
International Offices: Buenos Aires, Argentina; Artarmon, N.S.W. Australia; Brussels, Belgium; Rio de Janeiro, Brazil; Santiago, Chile; Barranquilla, Colombia; Lima, Peru; Ndola, N. Rhodesia; Salisbury, S. Rhodesia; Johannesburg, Transvaal

EQUIPMENT TODAY FOR THE CHALLENGE OF TOMORROW

GARDNER-DENVER

GARDNER-DENVER Since 1859



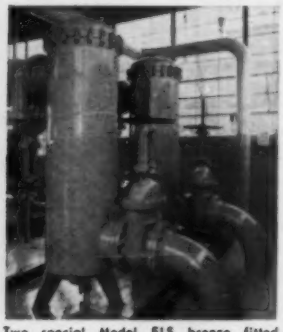
SPECIALISTS
FOR 40 YEARS

KEEP OIL, CHEMICALS, WATER FREE OF CONTAMINATION

Dollinger Staynew Liquid Filters efficiently trap rust, dirt, pipe scale—this assures cleanliness of the liquid involved, helps prevent equipment damage due to accumulation of foreign particles. Staynew Liquid Filters are widely used for cleaning oil on machine tools, for protecting hydraulic controls and diesel engine fuel oil injection systems, and for the filtering of most coolants. Staynew Liquid Filters are ideal for filtering water and all types of liquid chemicals. In fact, Staynew Liquid Filters—manufactured in accordance with the ASME code—are designed to handle practically *all* fluids efficiently and economically.

Two special Model ELS-690 bronze fitted filters with glastex media. Filters are copper plated throughout. Used to filter 50 GPM of naptha at 250°F in a midwestern electrical manufacturing plant.

Model ELS-250 Staynew Filter, bronze fitted with vinyon media, 4" pipe connections. Filter is used to clean a coolant used in a glass-cutting operation in a mirror manufacturing plant.



Two special Model ELS bronze fitted filters with 60 mesh screen cloth media and 14" flanged connections. Filters used to clean 3,000 GPM of cooling water for spot welding machines in an eastern metal stamping plant.

There are many advantages to using Staynew Liquid Filters. For instance, the exclusive radial fin construction provides the greatest active filtering area for available space . . . allows more contaminant collection on the outside, yet ample inside space for flow of clean liquid. "Slip-on" construction of the filter permits the filtering medium to be cleaned or replaced in minutes. Simple removal of a wing nut makes handling and maintenance easy. Sizes and models available to fit all applications.

If you have a liquid filtration problem—or any other types of filtration difficulties—consult your local Dollinger representative. He will be glad to discuss Dollinger's complete line of industrial filters with you. Or, write for Bulletin 300. Dollinger Corporation, 55 Centre Park, Rochester 3, N.Y.

PROTECTOSEAL

STAYNEW FILTERS

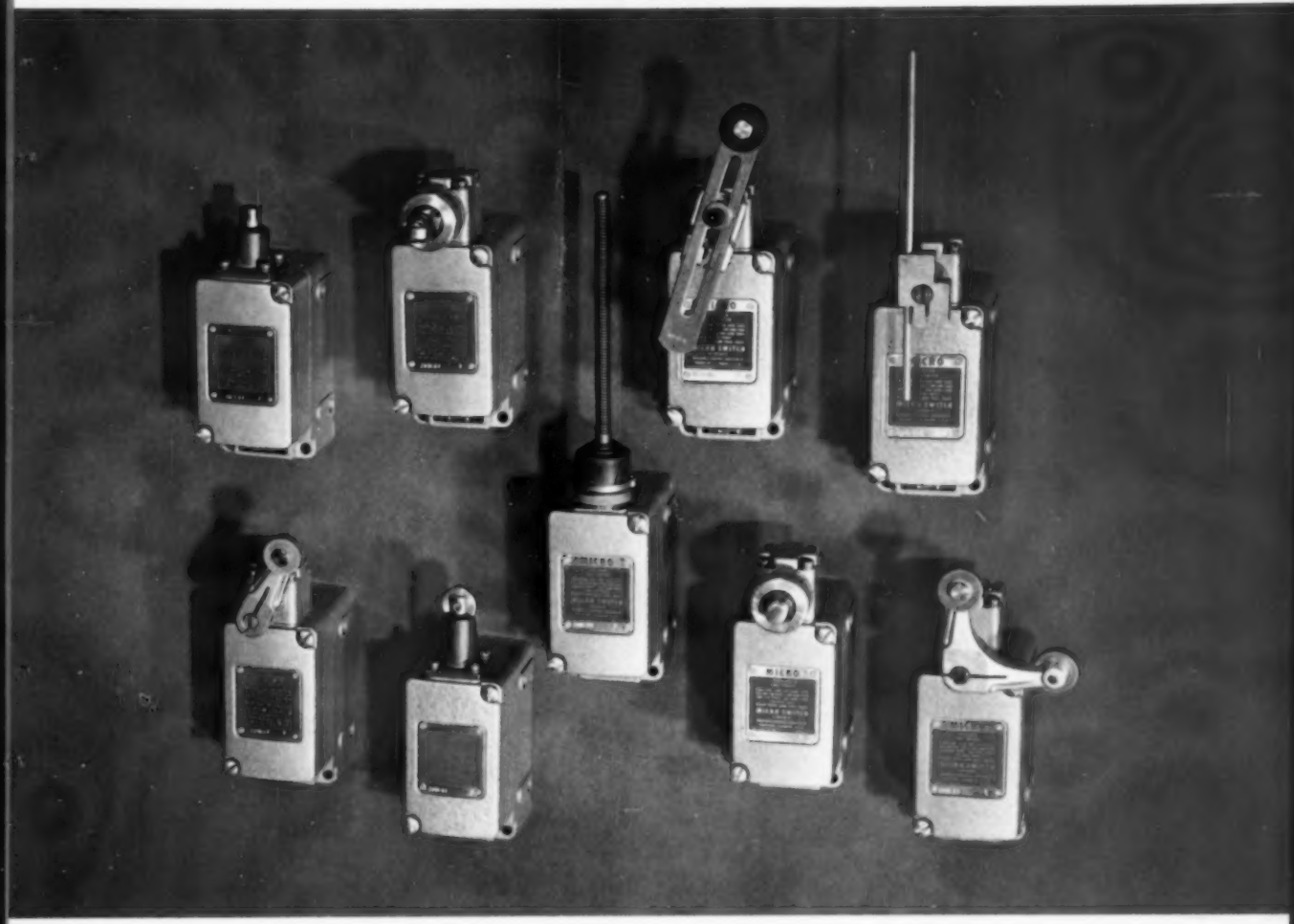
DOLLINGER

LIQUID FILTERS • PIPE LINE FILTERS • INTAKE FILTERS • HYDRAULIC FILTERS • ELECTROSTATIC FILTERS • MIST COLLECTORS • DRY PANEL FILTERS • SPECIAL DESIGN FILTERS • VISCOUS PANEL FILTERS • LOW PRESSURE FILTERS • HIGH PRESSURE FILTERS AUTOMATIC VENTILATION FILTERS • NATURAL GAS FILTERS • SILENCER FILTERS

Circle 588 on postcard, page 33

Circle 589 on postcard, page 33 →

MICRO SWITCH Precision Switches



Cut downtime to 20 seconds with

MICRO SWITCH "Plug-in Limit" Switches

The terminal block, permanently mounted, has no parts to wear out. The actuator-switch assembly plugs in like a radio tube.

The oil and liquid-tight seals and the wear resistant qualities of "200LS" snap-action limit switches make them ideal for use as dependable long-life safeties, limits and interlocks in the most severe industrial applications.

Spring plugs integrally molded into the precision snap-action basic switch in the actuator assembly plug into the integrally molded terminal receptacle. Two captive screws and a ring gasket seal the two units together.

Nine standard and many special actuators are available. The basic switches are two-circuit double break. Actuator heads are adjustable to four positions and the terminal blocks may be mounted from the side or back, providing extreme versatility for changing production requirements.

For further information, see the Yellow Pages for the nearest MICRO SWITCH branch office or distributor or write for Catalog 84.

MICRO SWITCH ... FREEPORT, ILLINOIS ... A division of Honeywell

In Canada: Honeywell Controls, Limited, Toronto 17, Ontario

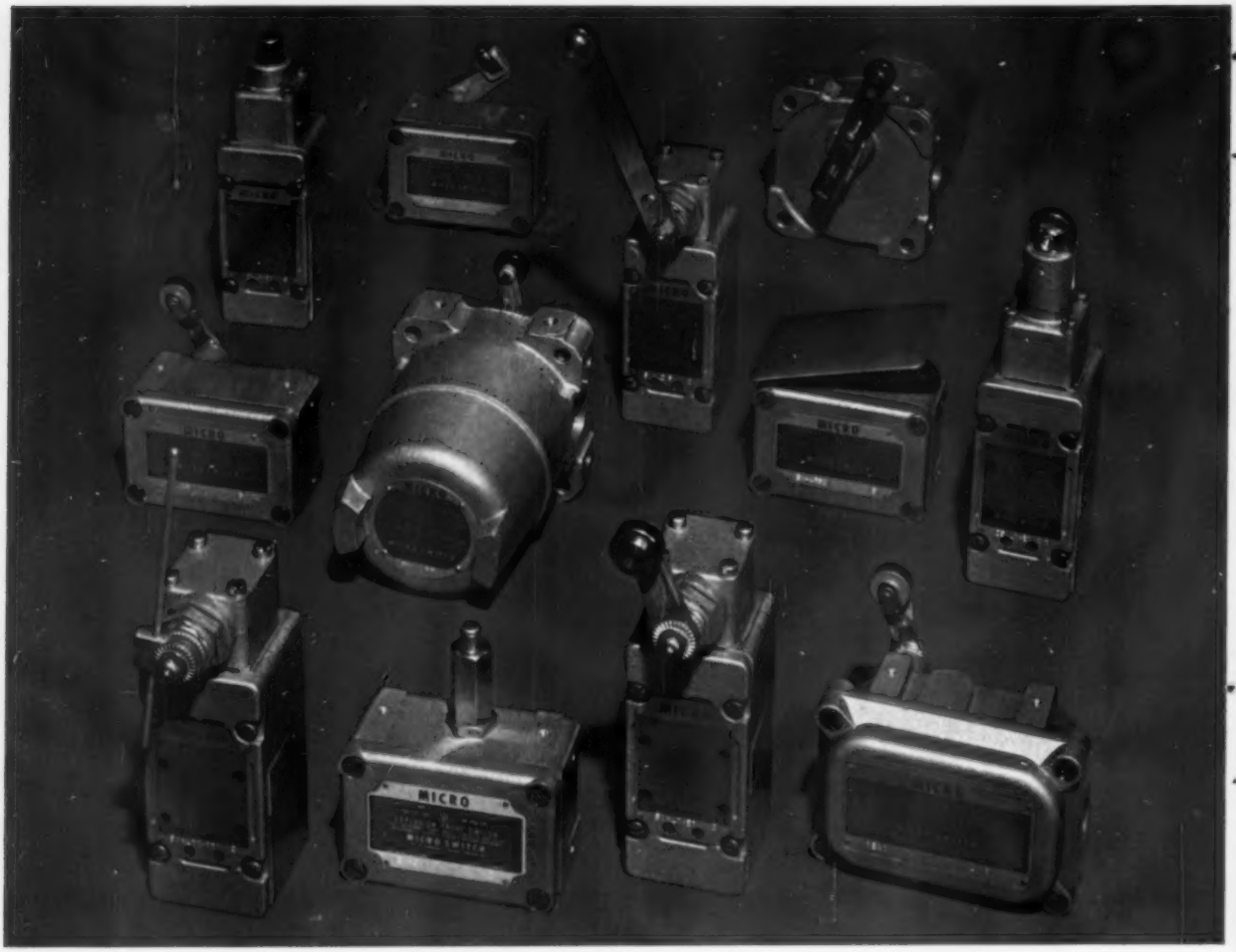
HONEYWELL INTERNATIONAL

Sales and service offices in all principal cities of the world. Manufacturing in the United States, United Kingdom, Canada, Netherlands, Germany, France, Japan.

Honeywell

MICRO SWITCH Precision Switches

MICRO SWITCH Precision Switches



Added safety for switching in danger areas

EXPLOSION-PROOF Switches

"CX" series explosion-proof switches are rain and dust tight—valuable protection in hazardous outdoor locations. Note the two gasket seals and the accessibility for wiring to the two enclosed s.p.d.t. switching units.

MICRO SWITCH explosion-proof switches provide safe limit or interlock control functions in hazardous areas where there is danger of explosion of dust or volatile vapors. They are designed for heavy duty performance under the most severe operating conditions. The enclosed and well protected snap-action basic switching elements combine precision with long life.

All switches in this family are listed by Underwriters' Laboratories for use in hazardous atmospheres Class I, Groups C and D; Class II, Groups E, F and G. Some are also listed for Class I, Group B.

Available with a variety of actuators, circuit arrangements, electrical ratings, and operating characteristics.

See the Yellow Pages for the nearby MICRO SWITCH branch office or distributor, or write for Catalogs 83 and 84.

MICRO SWITCH . . . FREEPORT, ILLINOIS . . . A division of Honeywell

In Canada: Honeywell Controls, Limited, Toronto 17, Ontario

Honeywell

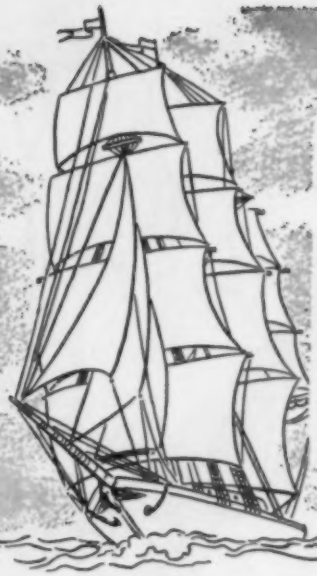
MICRO SWITCH Precision Switches

HONEYWELL INTERNATIONAL

Sales and service offices in all principal cities of the world. Manufacturing in United States, United Kingdom, Canada, Netherlands, Germany, France, Japan.

Why Rust-Oleum is different—

and what this difference, backed by 35 years of industry proof, means to you!



A Sea Captain developed it . . . Industry proved it!

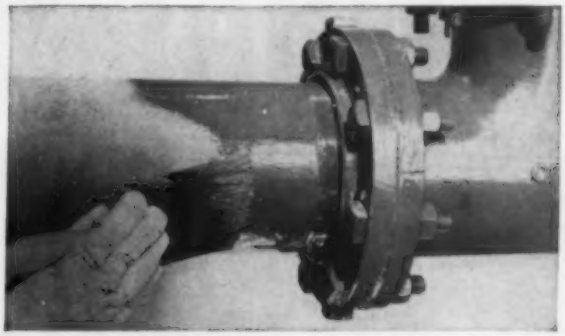
The original Rust-Oleum formula was developed nearly fifty years ago by Sea Captain Robert Fergusson, who became intrigued with the rust-stopping qualities of fish oil early in his career. Creating a *special treatment* for the fish oil, he used the *specially-processed fish oil* as the vehicle in combination with fine rust-inhibiting pigments. The result? A coating that actually *stopped rust* when applied directly over sound rusted surfaces, after scraping and wirebrushing to remove rust scale and loose rust. Possible, because the *specially-processed* fish oil penetrated the rust to bare metal. This was the birth of Rust-Oleum's *exclusive* 769 Damp-Proof Red Primer.

PROVED THROUGHOUT INDUSTRY FOR OVER 35 YEARS

Today, Rust-Oleum in its many systems and colors, has been proved throughout industry for over thirty-five years. This proof by leading industrial users is your assurance of savings in time, money, and metal. Economies made possible by the fact that Rust-Oleum 769 Damp-Proof Red Primer goes right over the sound rusted metal—usually eliminating costly surface preparations. And Rust-Oleum, in its various systems, resists rain, sun, fumes, heat, weathering, chemicals, etc., for lasting beauty over the years.

RUST-OLEUM NEW COLOR HORIZONS SYSTEM

The Rust-Oleum New Color Horizons System introduces a new coating concept to industry. It combines four important factors: (1) the ability to stop rust, (2) smart, modern color harmony, (3) the durability to last and last, (4) ease of application that saves time, money, and metal. See how this system can bring lasting beauty to your plant, machinery, equipment, pipes, tanks, structural steel, fences, etc. Write for complete information or contact your nearby Rust-Oleum Industrial Distributor. He maintains complete stocks for prompt service.



RUST-OLEUM®

There are imitations, but only *one* Rust-Oleum. It is distinctive as your own fingerprint.

STOPS RUST!®

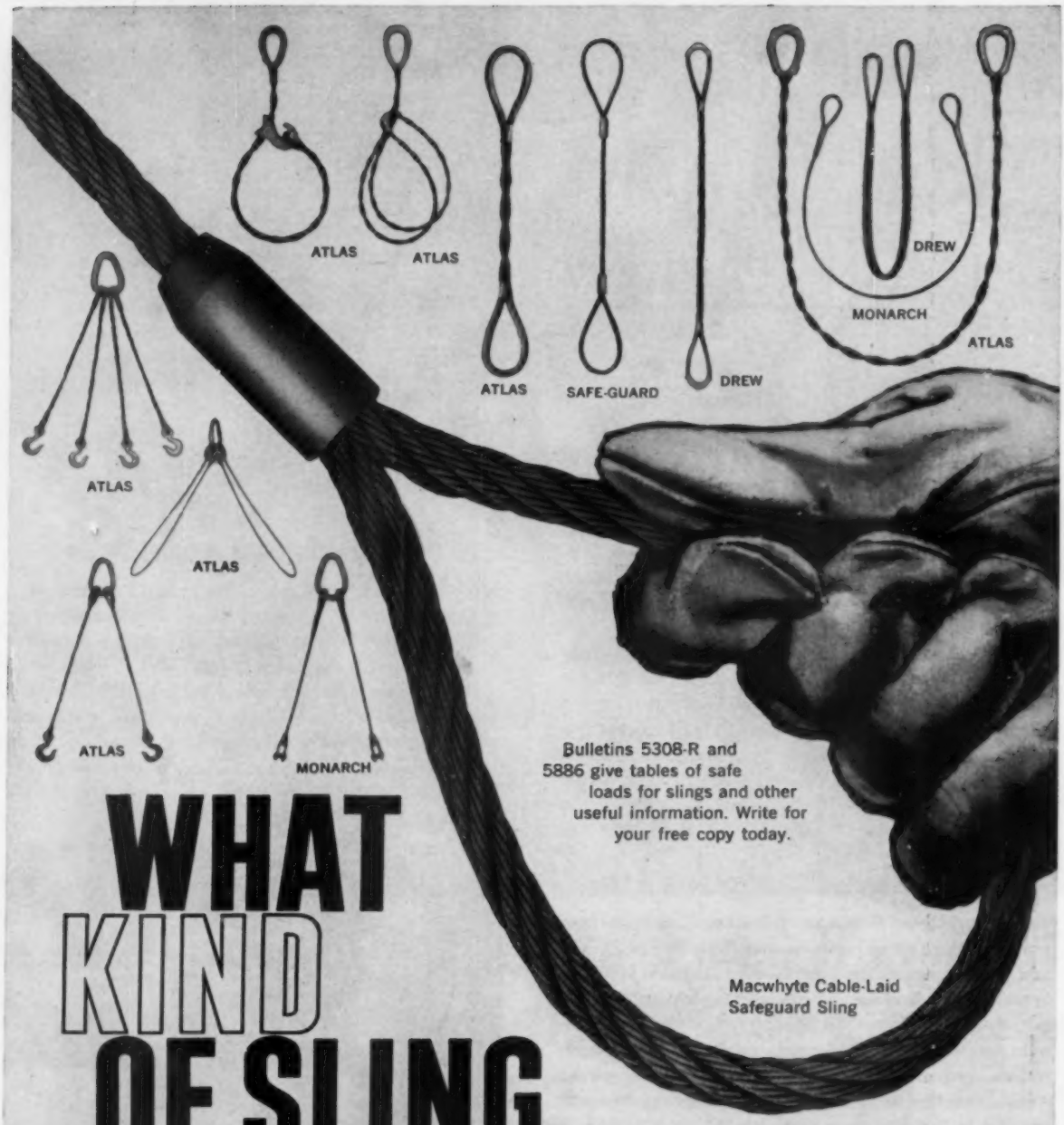
ATTACH TO YOUR LETTERHEAD

Rust-Oleum Corporation
2489 Oakton St., Evanston, Illinois

Please send me the following at no cost or obligation:

- ☐ New Color Horizons Systems Catalog featuring 110 actual color standards and 69 photo applications.
- ☐ Free test sample of Rust-Oleum 769 Damp-Proof Red Primer to be applied over sound rusted surface.
- ☐ Results of radioactive tracing study on Rust-Oleum fish oil penetration.

Circle 590 on postcard, page 33



Bulletins 5308-R and 5886 give tables of safe loads for slings and other useful information. Write for your free copy today.

Macwhyte Cable-Laid Safeguard Sling

WHAT KIND OF SLING

GIVES YOU SAFEST, EASIEST SERVICE?

Whatever it is, Macwhyte makes it. The right Macwhyte is among hundreds of sizes and types designed for lightness, flexibility, and easy handling. Standard body styles include Atlas round-braided, Drew flat-braided, and Safe-Guard cable-laid. Special slings will be designed for your unusual load-handling conditions.

You can rely on Macwhyte distributors to give you the best wire rope and slings.

DRILLING ★ INDUSTRIAL ★ AIRCRAFT ★ MINING ★ LOGGING
THE RIGHT MACWHYTE
MACWHYTE WIRE ROPE
MADE IN U.S.A.
CONSTRUCTION ★ MARINE ★ ELEVATOR

MACWHYTE WIRE ROPE COMPANY

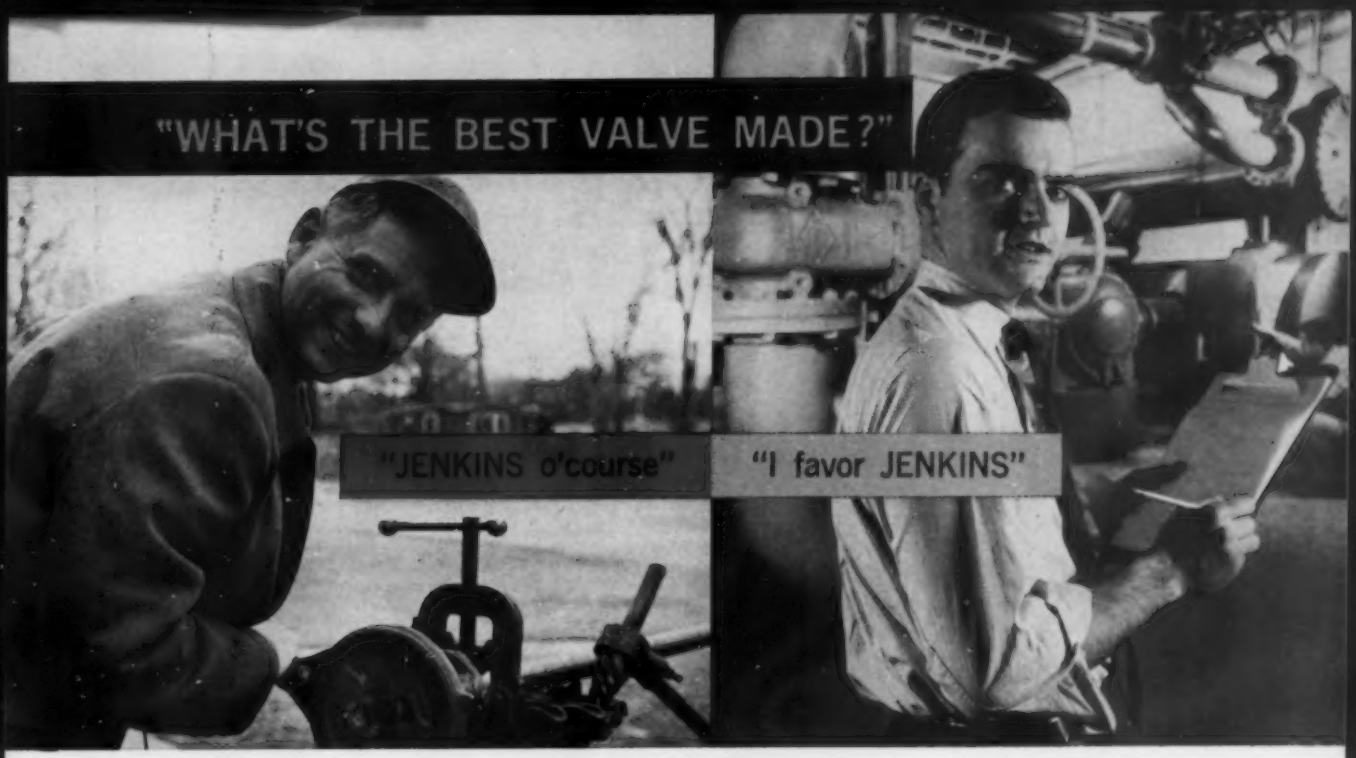
2900 FOURTEENTH AVENUE, KENOSHA, WISCONSIN

Wire Rope Manufacturing Specialists Since 1896

345

Circle 591 on postcard, page 33

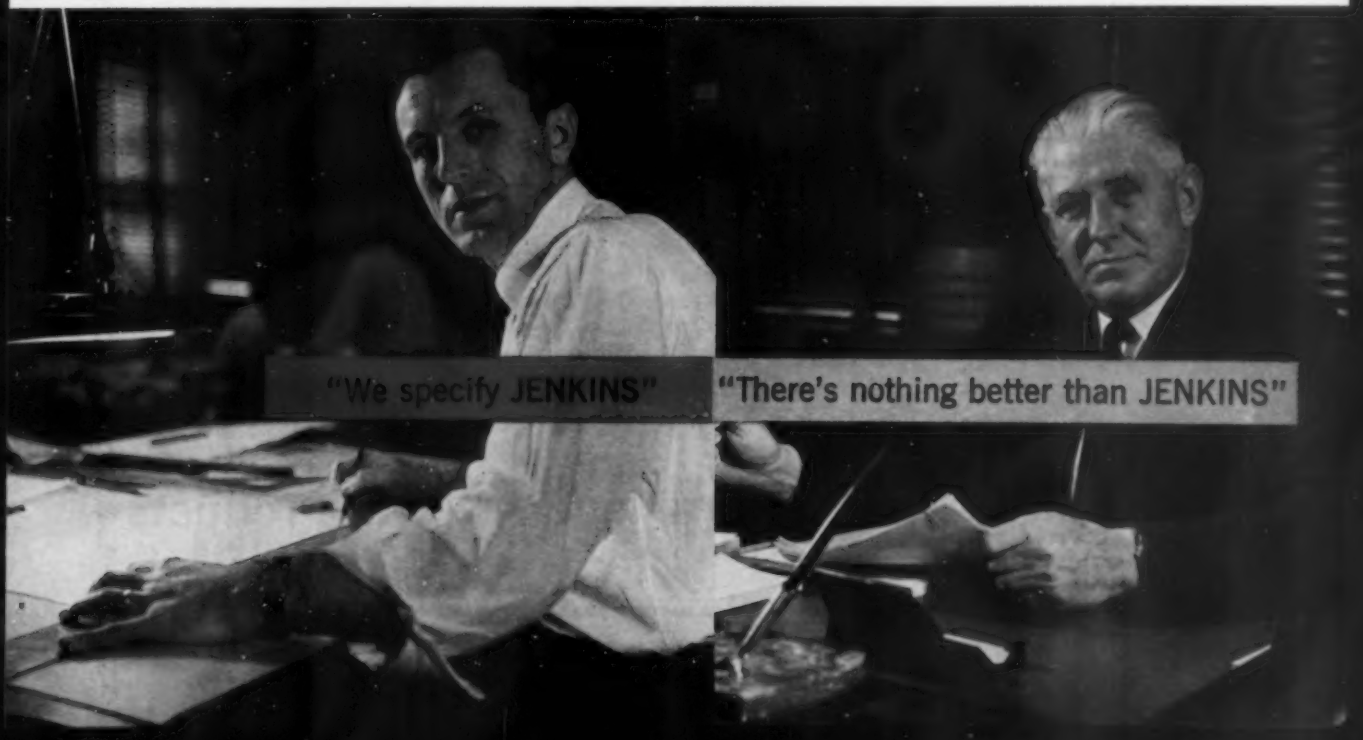
Circle 592 on postcard, page 33 ➔



Trusted by Everyone

JENKINS VALVES and the Supply Service of the local JENKINS DISTRIBUTOR

When you deal with the local Jenkins Distributor, you get the protection of a DOUBLE ASSURANCE of satisfaction: Valves of unexcelled quality and supply service of the highest caliber. Only the most competent distributors are selected by Jenkins Bros. to be the local sales and service facilities for Jenkins Valves. They have the stock, know-how and integrity to justify your full confidence. You'll find it good business to deal with your local Jenkins Distributor ...an important part of Jenkins Bros.



Steel for Strength Durability Economy

Armco Pipe Helps Solve Unusual Industrial Storm Sewer Problem

Uncovered here are the unusual solid limestone obstructions encountered at the Royal McBee site.

Same view as at left, after tops of pinnacles were removed and Armco Pipe installed in the trench.

In planning a new typewriter plant for Royal McBee Corporation at Springfield, Missouri, the architect-engineer firm of Giffels & Rossetti, Detroit, found "waves" of solid limestone just below ground level to hinder installation of the storm sewer system.

Several sewer pipe requirements became apparent. (1) Flexibility, (2) Positive connections, (3) Strength to bridge the rock pinnacles. Also, life-expectancy had to be equal to that of the plant.

Considering these factors, Giffels & Rossetti said, "Only one pipe material was practical for storm sewers on this plant site, and that was asphalt-coated corrugated metal pipe."

Installed for this storm sewer were 6,210 lineal feet of Armco PAVED-INVERT®, full-coated, pipe in 10 diameters from 8 to 48 inches.

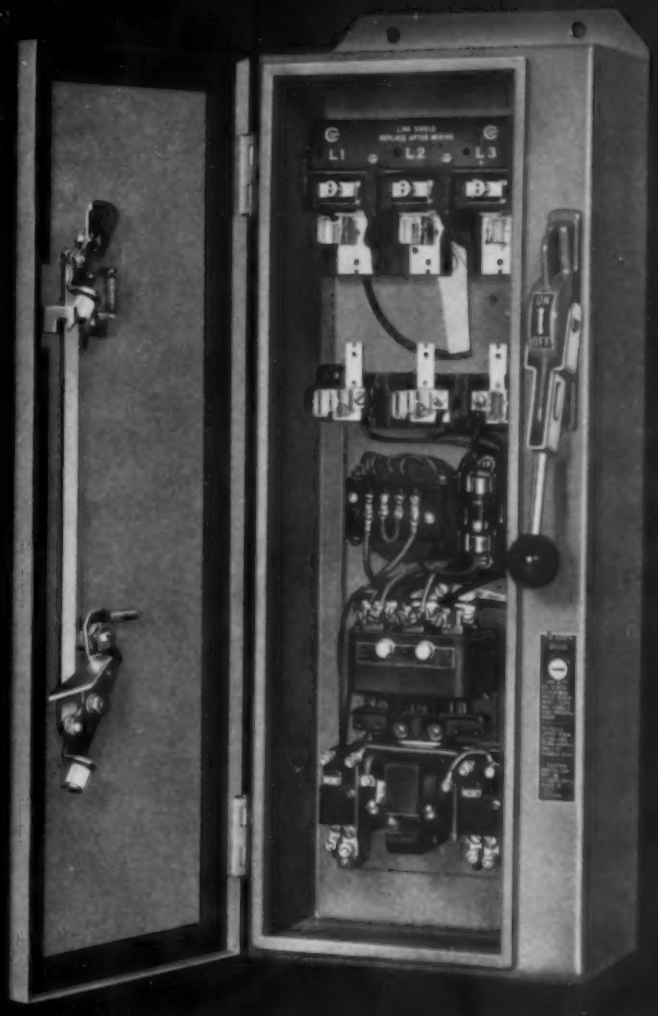
For more data on Armco Corrugated Metal Pipe products for *your* applications, see your local Armco Sales Engineer, or write to Armco Drainage & Metal Products, Inc., 4051 Curtis Street, Middletown, Ohio.

ARMCO Drainage & Metal Products

Circle 593 on postcard, page 33

NEW
FROM CLARK

NEMA 12 SAFETY COMBINATION STARTERS WITH THREE EXCLUSIVE FEATURES



Safety fusible combination starters are gaining wide interest throughout industry. But only the new Clark line offers these important features:

- *New Clark-built visible blade disconnect switch with double-break, silver-alloy to silver-alloy contact surfaces*
- *Disconnect switch accommodates NEC or the new Class J Current Limiting fuses*
- *To simplify installation, complete unit can be removed from enclosure in seconds with no disassembly of handle mechanism*

New Clark Safety Starters offer non-teaseable, snap-action disconnect switch operation. Cabinet design permits only authorized persons to open door when switch is on, or to close switch when the door is open. Dust-tight operation is assured by interlock which requires door handle to be closed and door tightly latched before disconnect switch is operable.

These Clark Safety Fusible Combination Starters are available with interchangeable fuse clips to accommodate a full range of fuses, and are offered with famous Clark "CY" Contactors in sizes 0, 1, and 2. Designed for NEMA 12 (industrial) service, they also are suitable for NEMA 5 (dust-tight) applications. For information, call the nearest Clark distributor or sales office, or write: 61SCS1

THE CLARK CONTROLLER COMPANY

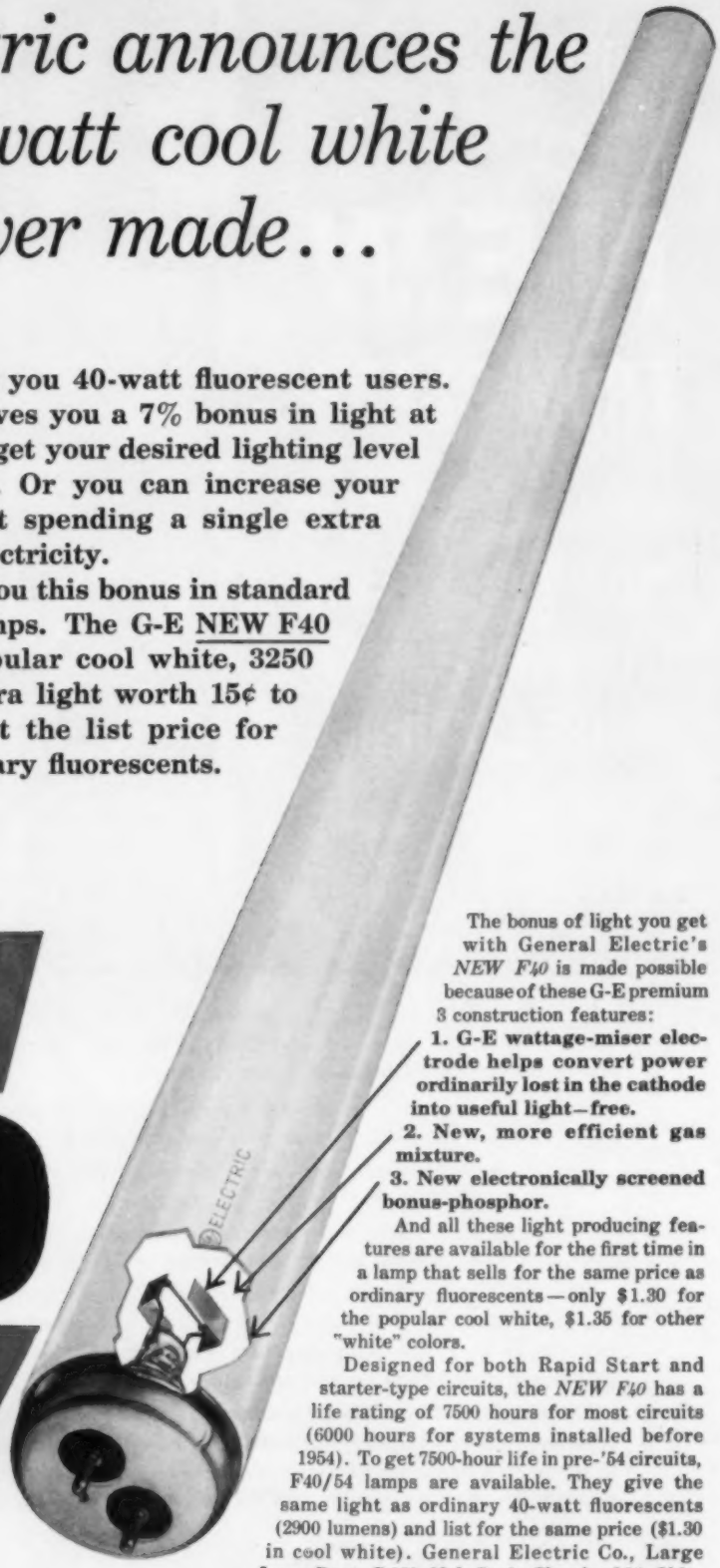
MAIN PLANT: CLEVELAND, 10 • **WESTERN PLANT:** LOS ANGELES, 58
IN CANADA: CANADIAN CONTROLLERS, LIMITED, TORONTO, ONT.

Circle 594 on postcard, page 33

General Electric announces the brightest 40-watt cool white fluorescent ever made...

Here's money-saving news for you 40-watt fluorescent users. General Electric's NEW F40 gives you a 7% bonus in light at no extra cost. With it you can get your desired lighting level with fewer lamps and fixtures. Or you can increase your existing lighting level without spending a single extra penny for lamps, fixtures or electricity.

Only General Electric offers you this bonus in standard 40-watt "white" fluorescent lamps. The G-E NEW F40 is rated at 3100 lumens in popular cool white, 3250 in white or warm white—extra light worth 15¢ to 30¢ a lamp to most users. Yet the list price for this lamp is the same as ordinary fluorescents.



NEW F40 ONLY 1.30 LIST

The bonus of light you get with General Electric's *NEW F40* is made possible because of these G-E premium 3 construction features:

1. G-E wattage-miser electrode helps convert power ordinarily lost in the cathode into useful light—free.

2. New, more efficient gas mixture.

3. New electronically screened bonus-phosphor.

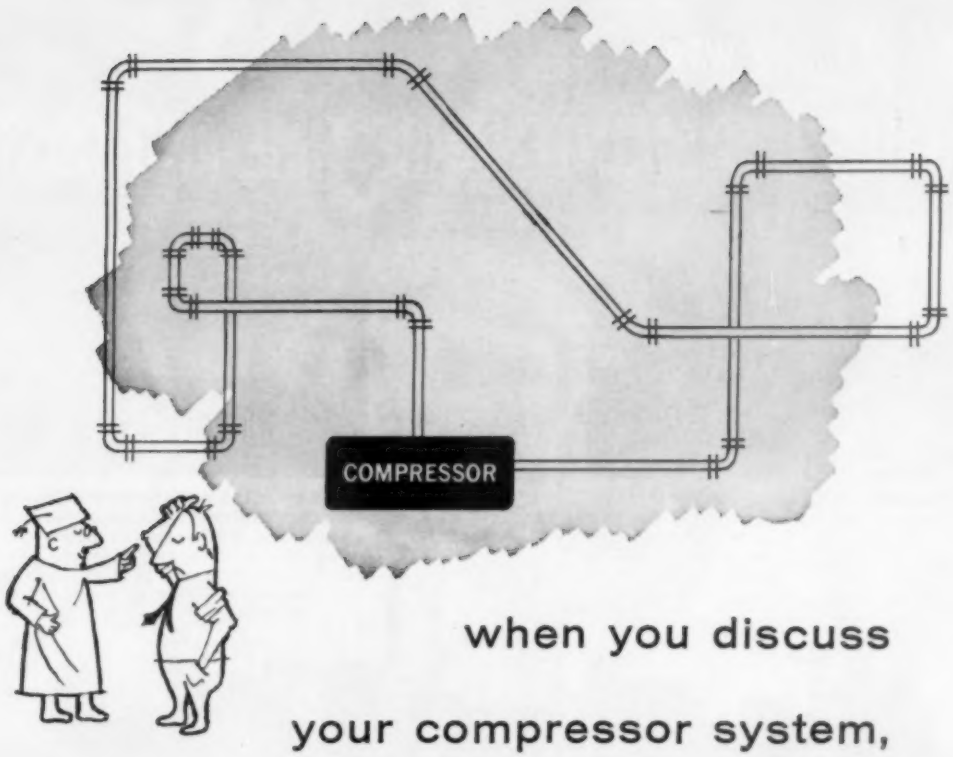
And all these light producing features are available for the first time in a lamp that sells for the same price as ordinary fluorescents—only $1.30 for the popular cool white, $1.35 for other "white" colors.

Designed for both Rapid Start and starter-type circuits, the *NEW F40* has a life rating of 7500 hours for most circuits (6000 hours for systems installed before 1954). To get 7500-hour life in pre-'54 circuits, F40/54 lamps are available. They give the same light as ordinary 40-watt fluorescents (2900 lumens) and list for the same price ($1.30 in cool white). General Electric Co., Large Lamp Dept. C-121, Nela Park, Cleveland 12, Ohio.

Progress Is Our Most Important Product

GENERAL ELECTRIC

Circle 595 on postcard, page 33



when you discuss your compressor system, what does **PAR** mean to you?

THE WORD HAS MANY DEFINITIONS

PAR to the golfer means the number of strokes allotted per hole or for the round of golf.

PAR to the investor is the established nominal value of a security or certificate of stock.

PAR can be an amount which is taken as an average or mean... an average level, etc.

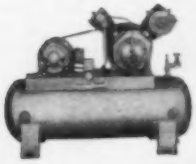
Possibly the only connotation you might place on PAR is the expression that it's either up to PAR or not up to PAR, meaning up to standard.

BUT THERE'S ANOTHER MEANING TOO

At Ingersoll-Rand Company we like to think of PAR in terms of a "PLANNED ANNUAL REVIEW" of a customer's air power system. The newest, most efficient air-operated devices are only as effective as the power that drives them, and usually low air pressure is the reason for equipment not functioning properly.

An Ingersoll-Rand AIRengineer will be happy to help you plan present or future air requirements and keep you abreast of the latest developments in tools and air systems. He will make sure you get the biggest dividend on your payroll dollars from a carefully PLANNED ANNUAL REVIEW of your air power system. Let us schedule a PAR for you now.

Air-cooled compressors 1/2 through 125 horsepower



Type 30 Compressors
1/2 through 20 hp
pressures to 250 psi

Type 40 Compressors
25 through 125 hp
pressures to 125 psi

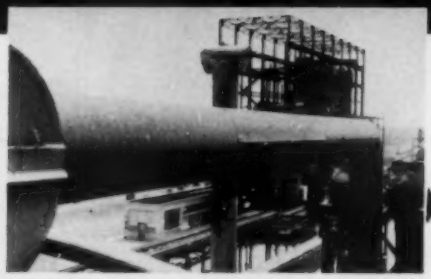
Ingersoll-Rand
248A3 11 Broadway, New York 4, N. Y.

OTHER I-R COMPRESSORS TO 7500 HP—PRESSURES TO 5000 PSIG.

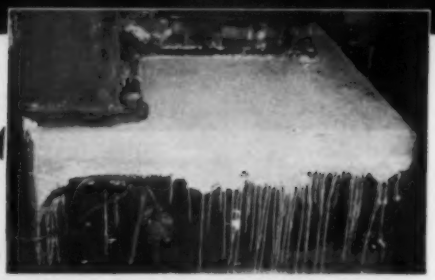
Circle 596 on postcard, page 33

Just 5 of many ways

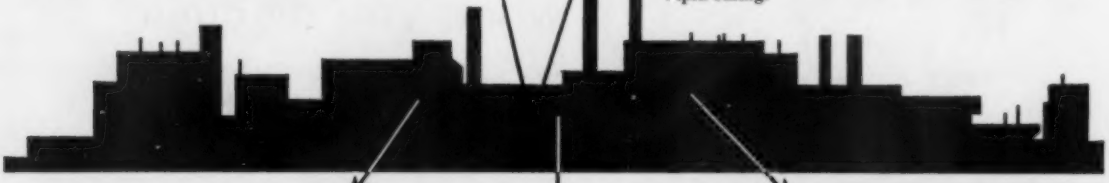
EPOXIES CUT MAINTENANCE TIME AND COSTS



RUSTED VACUUM LINE REPAIRED WITH EPOXY; SAVES $3,400! Rather than replacing this rusted, pitted 10-inch vacuum line, repairs were made with BAKELITE epoxy resin and glass cloth. Despite 2 years of exposure to a chemically corrosive atmosphere, the "new" pipe is still vacuum-tight.

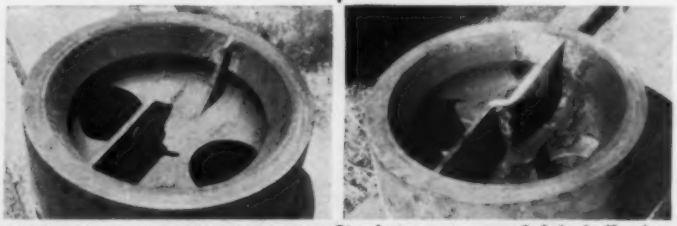


EPOXY GROUTING WITHSTANDS TREMENDOUS COMPRESSOR VIBRATION! Subjected to pounding vibration for more than 4 years, BAKELITE epoxy-based grouts show no sign of failure. Epoxies are a "natural" for this job because they offer high strength, low shrinkage, resistance to grease and oils, and rapid curing.



SURE FOOTING—WET OR DRY! A sand-filled epoxy mixture was troweled onto this railroad siding ramp at ¼" thickness. One year later, the non-slip surface is still like new. Compounds based on BAKELITE liquid epoxy resins can be brushed or sprayed, too.

VALVE CRACK PATCHED FOR $64! This 24-inch valve cracked when it was tested under pressure. Cause: improper tightening of flange bolts. Replacement and labor would have cost $1600. But the crack was quickly patched with only $64 worth of BAKELITE epoxy and glass cloth—and no down time. After 2 years of use, it's still good as new.



BAFFLE PLATE REPAIRED IN HALF A DAY! Circulating water corroded the baffle plate on this heat exchanger (left). Using thixotropic epoxy putty and steel reinforcing, repairs were made in a few hours (right). Alternative method would have put the heat exchanger out of service for 3 or 4 days.

For more information on how you can solve maintenance problems with epoxies, contact your supplier of BAKELITE epoxy compounds. Or write Dept. KE-100P, Union Carbide Plastics Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N. Y. *In Canada:* Union Carbide Canada Limited, Toronto 12.

UNION CARBIDE PLASTICS

BAKELITE and UNION CARBIDE are registered trade marks of Union Carbide Corporation

Circle 597 on postcard, page 33

try this on your pipe...

(it's Pittsburgh Fiber Glass Pipe Insulation)

Acme Insulation Company, Pittsburgh, did . . . on the piping job at Pittsburgh's new Gateway Parking Garage in Gateway Center. And here's what Acme owner Walter S. Peebles says about this installation:

"We chose Pittsburgh Fiber Glass Insulation for its efficiency, appearance and permanence. It's lightweight, handles easily, cuts readily with a knife, is quickly applied. There's a minimum of waste material.

"We've found that Pittsburgh Pipe Insulation holds its size and shape, does not effect the metal it covers, and has a fine record for low-cost maintenance. We used 8,300 ft of it on ½" to 14" pipe for underground heating, snow melting, chilled water lines, general plumbing, sill cocks and drain lines.

"It's probably the finest insulation that can be used, especially in subsurface locations."

FOR TOP THERMAL CONTROL, THIS IS IT! Pittsburgh Fiber Glass Pipe Insulation is a molded flexible hollow cylinder, slit along its length to provide quick application to pipes or tubing. It has high thermal efficiency for any type pipe insulating job and is surprisingly economical. You can get complete details from your nearest PPG Fiber Glass Sales Office, or by writing to *Pittsburgh Plate Glass Company, Fiber Glass Division, One Gateway Center, Pittsburgh 22, Penna.*

SALES OFFICES: Atlanta, Attleboro, Buffalo, Charlotte, Chicago, Cincinnati, Cleveland, Dallas, Denver, Detroit, Fort Wayne, Houston, Kansas City, Los Angeles, Louisville, Milwaukee, Minneapolis, New Orleans, New York, Philadelphia, Pittsburgh, St. Louis, San Francisco and Washington.

FIBER PG GLASS PITTSBURGH PLATE GLASS COMPANY

Circle 598 on postcard, page 33

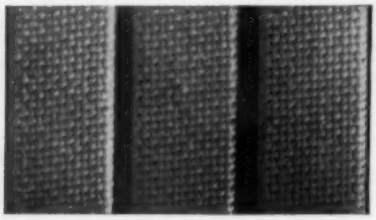
EXIDE POWER PACKAGE

Exide Industrial Marketing Division, The Electric Storage Battery Company, Philadelphia 20, Pa. (ESB)

85 AMP-HR—ONLY 22⅝ in. HIGH!

Here's the new high in battery capacity for electric industrial trucks—the Exide-Ironclad TSC Battery. It is available right now and it will fit in the battery compartments of your present trucks without modification. It conforms to the design thinking for future trucks as expressed by truck manufacturers.

This battery offers a capacity of 85 amp-hr per positive plate—increased from the previous highest available capacity of 80 amp-hr in the Exide-Ironclad TGS—and still with over-all height of 22⅝ in. The length and width dimensions of the battery are also unchanged. Therefore the new battery occupies the same space as present batteries.



New tubing boosts battery capacity

Side view of tubing magnified twice size shows the fine mesh with thousands of pores for easy flow of electrolyte. Holds active material firmly against loss.

A unique feature of the Exide-Ironclad Battery is the tubular construction of the positive plates. With the square-shaped tube, introduced over a year ago in the TGS Battery, Exide made it possible to get higher capacity from each positive plate through greater area in contact with the electrolyte.

Now, in the TSC Battery, Exide introduces woven mesh tubing, still square shaped, but with higher porosity for easier access of electrolyte. This new tubing is able to hold more active material, which, in addition to the higher porosity, results in higher capacity than ever before. The tubing is of a special nonoxidizing material of proven long life in extensive laboratory tests and field applications.

This increase in battery capacity has been achieved without increasing the height of the battery. Thus you can step up the work capacity of your present trucks without the extra expense of modifying the battery compartments. The Exide-Ironclad TSC is still only 22⅝ in. high. Likewise its specific gravity is still only 1.275. Hence battery life potential remains high.

With the introduction of the Exide-Ironclad TSC, Exide now makes it possible for you to match your particular battery power requirements more closely than ever. If you are ready to buy a new truck or new battery now, talk with your Exide representative about how you can get the maximum power for your dollar.

Only Exide offers so broad a range of battery types: Exide-Ironclad, Exide-Powerclad premium flat plate, and Exide Nickel-iron alkaline (invented by Thomas A. Edison). Exide chargers are available in both motor-generator and silicon rectifier types, in sizes to cover all needs. Exide service men are coast to coast, all factory trained in both batteries and chargers.

Make sure you get maximum economy in your battery power. Write Exide Industrial Marketing Division, The Electric Storage Battery Company, Philadelphia 20, Pa.

Exide®

Circle 599 on postcard, page 33

Nalco's Specialized Metallurgical Skills and Facilities Find Causes; Prevent Metal Failures

A ruptured boiler tube is a catastrophe wherever and whenever it occurs. The one shown above, sent to Nalco Laboratories for metallurgical analysis, revealed that prolonged overheating was the basic cause, with several contributing factors. Recommended changes in chemical treatment and operative procedures can help prevent recurrence.

Boiler metal failures are not a frequent occurrence in modern steam plants. But with thousands of operating boilers in service, failures do occur . . . enough of them to make necessary keeping Nalco's specialized metallurgical skills and facilities at work analyzing failures and their causes, with the continuing aim of developing "failure-proof" chemical treatment and control techniques.

Carefully selected, ground, polished, and etched steel specimens give up their secrets under metallographic microscopes at Nalco (right). At left top is a normal low-carbon steel boiler tube structure, showing the intermixed crystals of ferrite and pearlite at 500 magnifications. Below normal structure is a section of tube metal at the same magnification which has developed carbide spheroidization, indicating undesirably high metal temperatures. This change in structure occurs after prolonged heating in the range of 900° F. to 1350° F., and is a combined function of time and temperature—occurring very slowly at 900° F., but often requiring only a few hours to develop at 1350° F.

Nalco's accumulation of metallurgical research and experience may be helping to protect your boiler metal against failure right now. Nalco was first among water treatment organizations to recognize the importance of metallurgy and metallography in complete water treatment services . . . And first to install the facilities and experts to track down the frequently obscure causes of metal failure. Finding preventive measures, both chemical and physical, has been going on in the Nalco Laboratories for about 25 years.

Complete metallurgical analysis must take in the entire situation. At Nalco, such a complete investigation may include water analysis, gravimetric analysis, flame photometry, X-ray diffraction, electron microscopy, and electron diffraction and spectroscopy. To our knowledge, Nalco is the only water treatment organization capable of making such complete investigations in this highly specialized field. For further data on boiler metallurgy, write for free Nalco Bulletin 61, and Nalco Reprint 32. To obtain prompt consultation regarding water treatment problems, call your Nalco Representative.

NALCO CHEMICAL COMPANY
6216 West 66th Place • Chicago 38, Illinois
Subsidiaries in England, Italy, Mexico, Spain, Venezuela and West Germany
In Canada: Alchem Limited, Burlington, Ontario

Nalco® ...Serving Industry through Practical Applied Science

Nalco CHEMICALS
Nalco SERVICES

Circle 600 on postcard, page 33

HOUGHTON SPECIAL LUBRICANTS

For 1000°F. lubrication a very unconventional and effective grease!

Ordinary petroleum oils break down or carbonize at 500°F. . . . a not-uncommon temperature in modern steel mills, foundries, ceramic and glass plants.

Bearings freeze up. Costly maintenance takes its toll.

A NEW APPROACH

In tackling the problem, Houghton researchers tried a new approach. Conventional greases have a fluid, petroleum-base lubricant and a soap thickener. The thickener carries the lubricant to the point of friction. At high temperatures both break down, or oxidize, and leave a gritty residue of carbon, gums and resins—an abrasive instead of lubricant.

Houghton technicians decided to reverse the functions of the fluid lubricant and the thickener by making the thickener the lubricant and the fluid the carrier. At elevated temperatures, a clean-burning, synthetic fluid carrier would completely volatize. The thickener, which would not oxidize or burn at high temperatures, would retain its lubricating properties up to the point of destruction. A revolutionary theory—and valid—and the basis for Houghton's new Hi-Temp 2409 lubricant!

HI-TEMP 2409

The difference between Hi-Temp 2409 and conventional thermal lubricants can easily be demonstrated by burning both with a blow torch. Residue from 2409 has a slippery feel and will not scratch a plastic surface. In contrast, the conventional lubricant turns to hard cinders which leave deep scratches in plastic—or which could chew up expensive bearings.

Hi-Temp 2409 has proved itself in dozens of different industrial operations subject to temperatures of 1000°F. and more: fan bearings, kiln cars, annealing cars, oven conveyors, valves, roller chains, charging cars and similar applications.

On the job, (pumped, sprayed or brushed on) Hi-Temp 2409 becomes fluid at 200°F. and forms a protective film over all bearing surfaces. At 500°F. the synthetic carrier vaporizes and leaves a soft coating of highly effective dry lubricant that withstands temperatures of 1000°F. and more.

Although it must inherently cost slightly more than conventional lubricants, this is dramatically offset by extended equipment life, reduced maintenance, and more efficient operation.

Write for Free Brochure

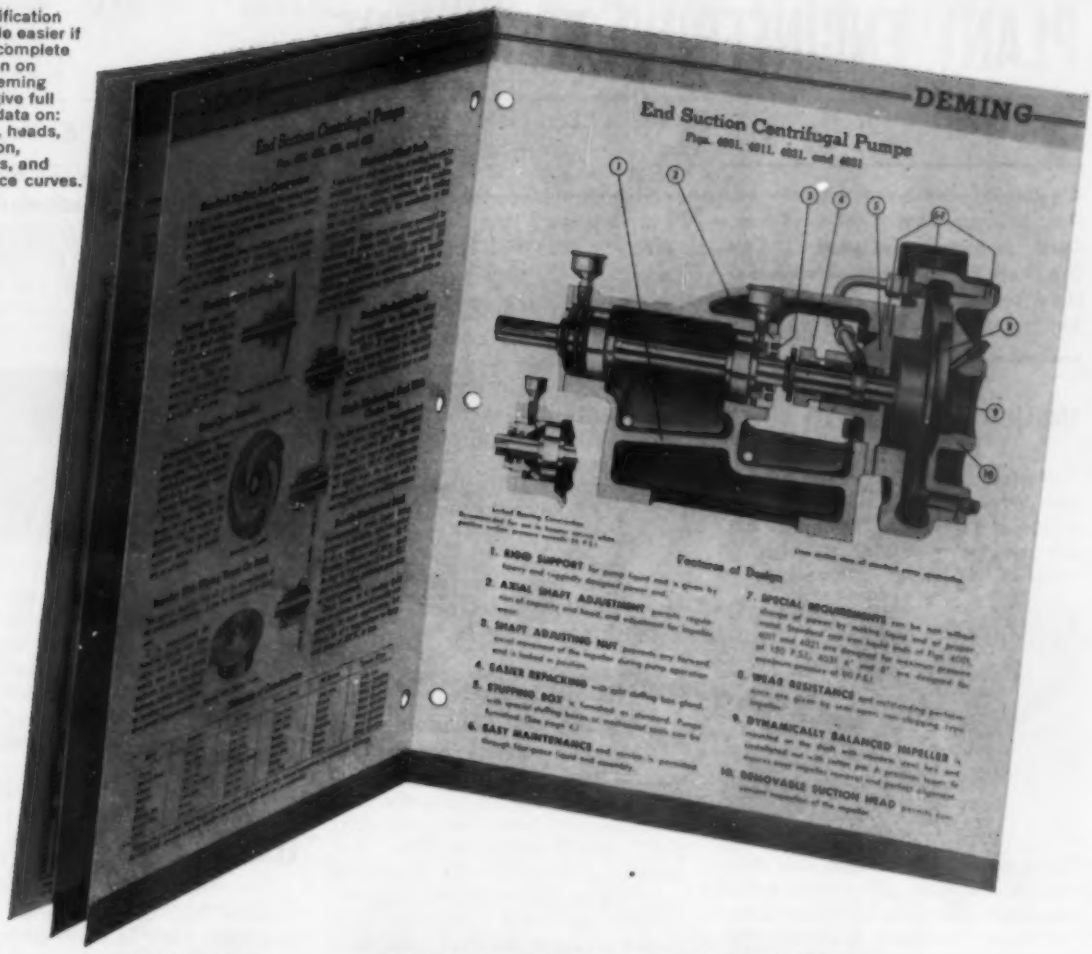
Houghton has developed lubricants for many high (and low) temperature requirements. They have long been a Houghton specialty. If you have a high temperature lubrication problem, any industrial lubrication problem, your Houghton representative has an economical answer. Call him or write: E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.

Houghton

INDUSTRY'S PARTNER IN PRODUCTION

Circle 601 on postcard, page 33

Your specification job is made easier if you have complete information on pumps. Deming bulletins give full technical data on: capacities, heads, construction, dimensions, and performance curves.



NOW...SEE WHY DEMING can pump your liquids at lowest cost

Here is pump information you can use when it's time to talk pumps in your company . . . or when it's time to specify. Up-to-the-minute Deming Bulletins covering immersion process pumps, vertical turbines, centrifugals, rotaries and other Deming quality pumps show you specifically why a Deming will handle the job efficiently . . . and at lowest cost.

Is corrosion your big problem? Power cost? Space? Transfer loading? . . . Do you pump acids? Abrasive slurries? Asphalt thick mixtures? Xylene thin solvents?

Then send for the literature on the pumps that interest you. With more than 10,000 Deming pump types, capacities and sizes to choose from, you have good reason to make Deming your headquarters for pumps and pump information. Buyers throughout the country rely on Deming.

DEMING
DIVISION CRANE CO.
948 Broadway • Salem, Ohio

Send the reply form now . . . and have the facts when you need them.

PLEASE SEND information on the following:

- ☐ Deming Vertical Turbines (or circle 738 on post card, page 33)
- ☐ Deming End Suction Centrifugal Pumps (or circle 739 on post card, page 33)
- ☐ Deming Sump Pumps (or circle 740 on post card, page 33)
- ☐ Deming Internal Gear Rotary Pumps (or circle 741 on post card, page 33)
- ☐ Deming Submersible Pumps (or circle 742 on post card, page 33)

Name_____

Title_____

Company_____

Address_____

City_____ Zone____ State_____

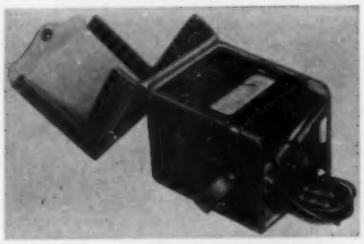
PLANT ENGINEERING EQUIPMENT.

Edited by M. E. Heniken

It's easy to obtain product data with the postage-free Reader Service Card provided on pages 33-34. Use them for information on advertised products, too. Just circle the key number at bottom of the ad.

INSULATION TESTER always ready for use

The Mark III, a pocket-size Megger instrument, with its constant voltage hand generator, provides steady testing voltage without dependence on batteries or other current supply.

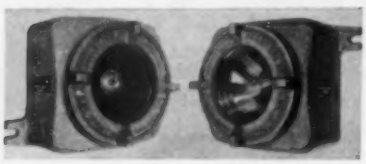


Three ranges are available—100 v d-c, 0.02-20 megohms, 250 v d-c, 0.05-50 megohms, 500 v d-c, 0.1-100 megohms —each with a double scale and selector switch for 0-10,000 ohms. The optional camera-type leather case offers protection in severe field service. Bulletin 21-85-52 describes the Mark III. James G. Biddle Co.

For details, circle 1 on Post Card

INFRA-RED DETECTION guards against trespassers

Tattleguard, an invisible electronic curtain security for plants and property, scans to 350 ft and operates day and night, indoors and out. Fully trans-



istorized, it consists of two units, transmitter and receiver, between which an invisible infra-red beam is passed. Interruption of this beam, by persons, animals etc., acuates a relay in the receiver which can be used to operate auxiliary equipment. Manufacturer says the unit is explosion-proof, fungus-resistant and will function in —40 F to 140 F with 100 per cent humidity. It operates on 12 v d-c. Alnor Instrument Co.

For details, circle 2 on Post Card

COATING, WRAP for underground piping connections

Rip-Coat is a mastic colloidal resin resistant to moisture, weathering, acids, alkalis and electrolysis. It is claimed unaffected by temperatures from sub-zero to 250 F, and to withstand severe distortion and bending. Rip-Coat is brushed on over the welded conduit joint and a glass-wrap material applied over it. A final coating of Rip-Coat is then applied over the wrap. Ric-wiL, Inc.

For details, circle 3 on Post Card

SOUND RESISTANT GLASS "soaks up" the noise

Acousta-Pane controls internal and external noise while providing the full visibility of glass. It's also described as shatterproof, being laminated safety glass. Manufacturer explains that, normally, glass vibrates in response to sound waves and transmits these vibrations as noise. Acousta-Pane's treated interlayer converts sound energy into tiny amounts of heat instead of passing it through as noise. This glass is reported to provide exceptional resistance to sound transmission in the frequency range between 1700 and 4000 dec—encompassing most plant and office machine noise, voices, other sounds. Amerada Glass Corp.

For details, circle 4 on Post Card

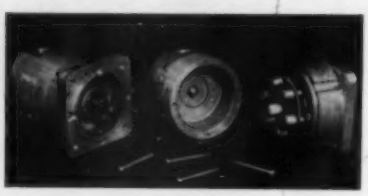
FLOW METERS for difficult, hazardous materials

Metal-tube Varea-meters are variable area flow meters for use at temperatures and pressures beyond range of glass-tube meters. They come with 150- and 300-lb flanges and are supplied in materials to handle a wide range of chemicals. Tube diameters range from ½ to 3 in., water capacities from 1 to 400 gpm and air capacities from 4.2 to 1680 scfm. Meters feature interchangeable floats. Each tube will accept any one of a family of floats, each having a capacity of about 20 per cent greater than next smaller size. This permits economical initial sizing and easy capacity change after installation. Wallace & Tiernan Inc.

For details, circle 5 on Post Card

CENTRIFUGAL SWITCH gives high repetitive accuracy

Synchro-Snap Centrifugal Switch with negligible friction can be used for speed sensing, overspeed and underspeed detection, speed interlocking, sequencing and signaling. It uses a



simple one-piece spring steel disc with weights fastened directly to disc. Centrifugal force of the weights overcomes rapid decrease in spring force, resulting in a snap action at operating speed. Normal operating speeds range from 900 to 4000 rpm and standard units operate at 1100 and 2200 rpm. Square D. Co.

For details, circle 6 on Post Card

ELECTROSTATIC FILTER is high-velocity unit

Type HVSC Electro-Cell is a self-contained, high velocity electrostatic precipitator for use in inaccessible areas and with air handling units. It comes complete with front and back duct connections, drain pan and pre-assembled washing and oiling mechanism, for floor or ceiling mounting. Installation and wiring of the power pack and adhesive pump and hook-up of water and drain connections is all that is needed on job site. Advantages announced include automatic maintenance, elimination of by-pass areas within collector cell. Insulators are outside air stream where they remain clean and electrically operative. The

How Much Steam Should a Steam Trap Trap?

. . . some answers to commonly asked questions about the primary job of a steam trap

You don't need a doctor's degree in thermodynamics to answer the question at the top of this page. Naturally, a steam trap should trap *all* the steam.

Unfortunately for you, the problem isn't quite that simple. After all, a shut off valve would trap all the steam . . . and condensate, and air, and carbon dioxide as well.

So we'd better amend the answer to the question this way: A steam trap should trap *all* the steam but *must* remove condensate, air and carbon dioxide as rapidly as they accumulate.

With this established, let's take a closer look at what's involved:

A Steam Trap Should Trap All The Steam

If you've had experience with several different makes of traps, you already know that some trap steam better than others. The operating principle of the trap is what makes the difference. We like to talk about it because Armstrong traps are designed so that no steam can get to the orifice. The valve is always water sealed. Result: *More efficient steam utilization, lower fuel costs.*

A Steam Trap Should Remove Condensate

All traps remove condensate—after a fashion. For maximum efficiency in the unit being drained, though, the trick is to get it out without waiting for it to cool and without leaking steam.

Armstrong's water sealed valve takes care of steam leakage. The inverted bucket operating principle opens the trap for water regardless of its temperature. This means you get the condensate out as quickly as it accumulates. Result: *Higher temperatures and better heat transfer in steam heated units.*

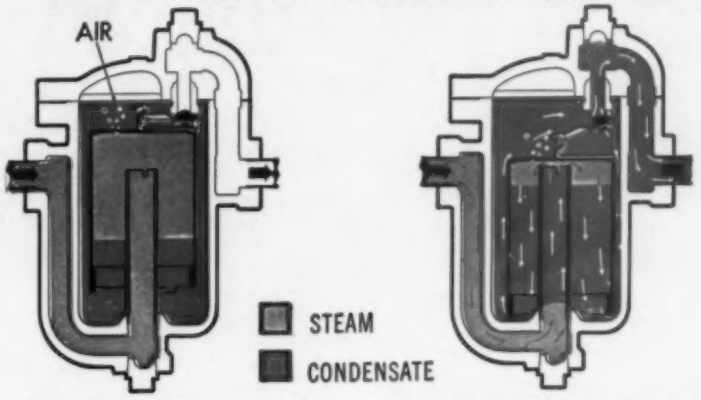
A Steam Trap Should Remove Air and CO_2

Part and parcel of the condensate removal problem is removal of air as well as oxygen and carbon dioxide—two real troublemakers. Air tends to reduce operating temperatures and interfere with heat transfer. CO_2 goes into solution to form corrosive carbonic acid which, for example, can eat unit heater tubes. O_2 aggravates the situation. Believe it or not, but all traps don't properly remove air and CO_2.

By now, you've probably guessed that Armstrong traps *do* remove air and CO_2. Armstrong design (see illustration) provides continuous venting of air and CO_2. By opening suddenly, the Armstrong trap creates a momentary pressure drop to "pump" the air down to be vented. Result: *Higher temperatures, faster heat-up, better heat transfer and reduced corrosion.*

Note: When required, specially sized air vents are furnished. For fast heat-up of low pressure on-and-off units, Armstrong provides open float and thermostatic air vent traps.

HERE'S THE STEAM TRAP DESIGN THAT GETS RID OF CONDENSATE AND AIR WITHOUT STEAM LOSS



Trap open. Condensate entering trap has caused bucket to lose buoyancy. Weight of bucket times leverage pulls valve open. Air is discharged along with condensate.

Trap closed. Steam has floated inverted bucket; valve is held tightly closed by system pressure. Air entering trap passes through bucket vent and accumulates at top of trap.

What's the Final Answer?

Summing it all up, you'll get the best service from steam heated units that are equipped with traps designed to trap *all* the steam and remove air and condensate as quickly as it accumulates. In our prejudiced viewpoint, this means Armstrong traps. More important are the several thousand users of Armstrong traps who have proved the point.

Circle 603 on postcard, page 33

Before you make up your mind, though, consider the minimum maintenance requirements of Armstrong traps . . . and the convenient assistance your local Armstrong Representative provides. These are important plus values.

Put Up or Shut Up

We're so confident that we "put up". Armstrong traps are unconditionally guaranteed to satisfy. So you can find out for yourself with practically no risk. If you're not completely satisfied with the way they do their job, you can get your money back.

• • •

The 44-page Armstrong Steam Trap book goes into greater detail on these and other Armstrong features. It also discusses trap selection, installation and maintenance. Ask your Armstrong Representative for a copy or write

Armstrong Machine Works
9127 Maple Street
Three Rivers, Michigan

ARMSTRONG STEAM TRAPS

PLANT ENGINEERING EQUIPMENT

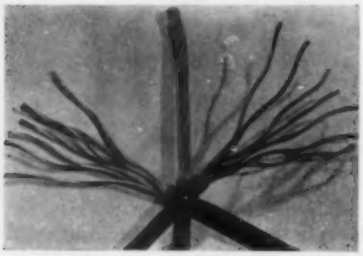
(Begins on page 182)

Type HVSC is available in 24 sizes from 1000 to 25,000 cfm. Bulletin 258B gives more information. American Air Filter Co., Inc.

For details, circle 7 on Post Card

SILICONE RUBBER WIRE with colored markings

Development of a new process using General Electric silicone rubber permits production of an insulation with multicolor marks. This permits use of smaller wires in multiconductor and



single hook-up cable and results in lighter weight, extra flexible, reduced-diameter cables. The smaller wires also eliminate braiding. Color-striped silicone rubber wire comes in AWG Sizes 24 through 10. Boston Insulated Wire and Cable Co.

For details, circle 8 on Post Card

TRANSDUCER converts temperature into air pressure

Mark III Transducer, designed to electronically convert temperature into air presssure, has transistorized circuitry and etched circuit boards. A transducer is the link between electronic sensing and pneumatic operation, which is said to permit air-conditioning control systems to use best features of each. With the transducer, the electronic control system becomes the "nerves" while the pneumatic system provides the "muscle". It can take inputs from up to three different thermostats, and send outputs to pneumatic motors, dampers and valves. Minneapolis-Honeywell Regulator Co.

For details, circle 9 on Post Card

AIRLESS SPRAY UNIT for medium production jobs

HydraAirless 28 is a medium production, economy model which performs equally well on small and intricate shapes or large, open surfaces. Assembly consists of pump and 10-gal container, high pressure hose assembly, H-Gun and tungsten carbide spray tips. The 28-to-1 ratio pump will provide pressures to 2800 psi. Unit operates on 1- or 1½-hp compressor, is priced at less than half that of many standard models. The Spee-Flo Co.

For details, circle 10 on Post Card

RECORD CARDS forecast motor, generator failure

This system predicts failures of electrical equipment based on use of an insulation resistance record card. By measuring insulation resistance of the equipment at regular intervals and entering the readings on this card a curve of insulation deterioration is secured. A sudden drop in the curve gives advance warning of insulation failure. A sample Vibrotest Record Card is offered. Associated Research, Inc.

For details, circle 11 on Post Card

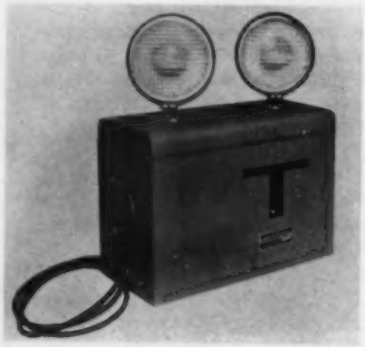
HOSE VALVE handles erosives, corrosives easily

The compact, lightweight Fluid-Trol Industrial Valve for washdown and airblow applications, has stainless steel body, nozzle and plunger. It provides tight shut-off, yet delivers more than 13 gpm at 75 psi. There are no springs, only two moving parts. It weighs 1 lb. General Kinetics Corp.

For details, circle 12 on Post Card

EMERGENCY LIGHT for use in destructive atmospheres

Light Warden Chargomatic 88WDV is hermetically sealed against dust, moisture, chemicals and fumes and designed to operate in areas unsuitable for conventional units. It plugs into



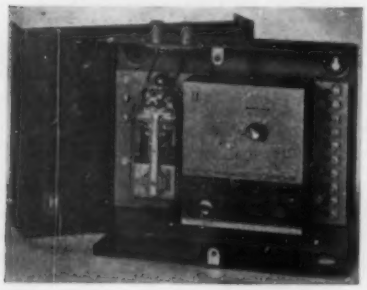
standard 115-v 60-cycle outlet, contains no manually-operated timers or switches. House current maintains battery charge, and loss of power turns on emergency lights immediately. When power is resumed, battery recharges itself automatically. Equipped with two flood heads, unit can support five lights in operation; battery is 6-v, 105 amp-hr lead acid glass jar type. All units have test switches, can have three-conductor cord and plug or Condulet. Electric Cord Co.

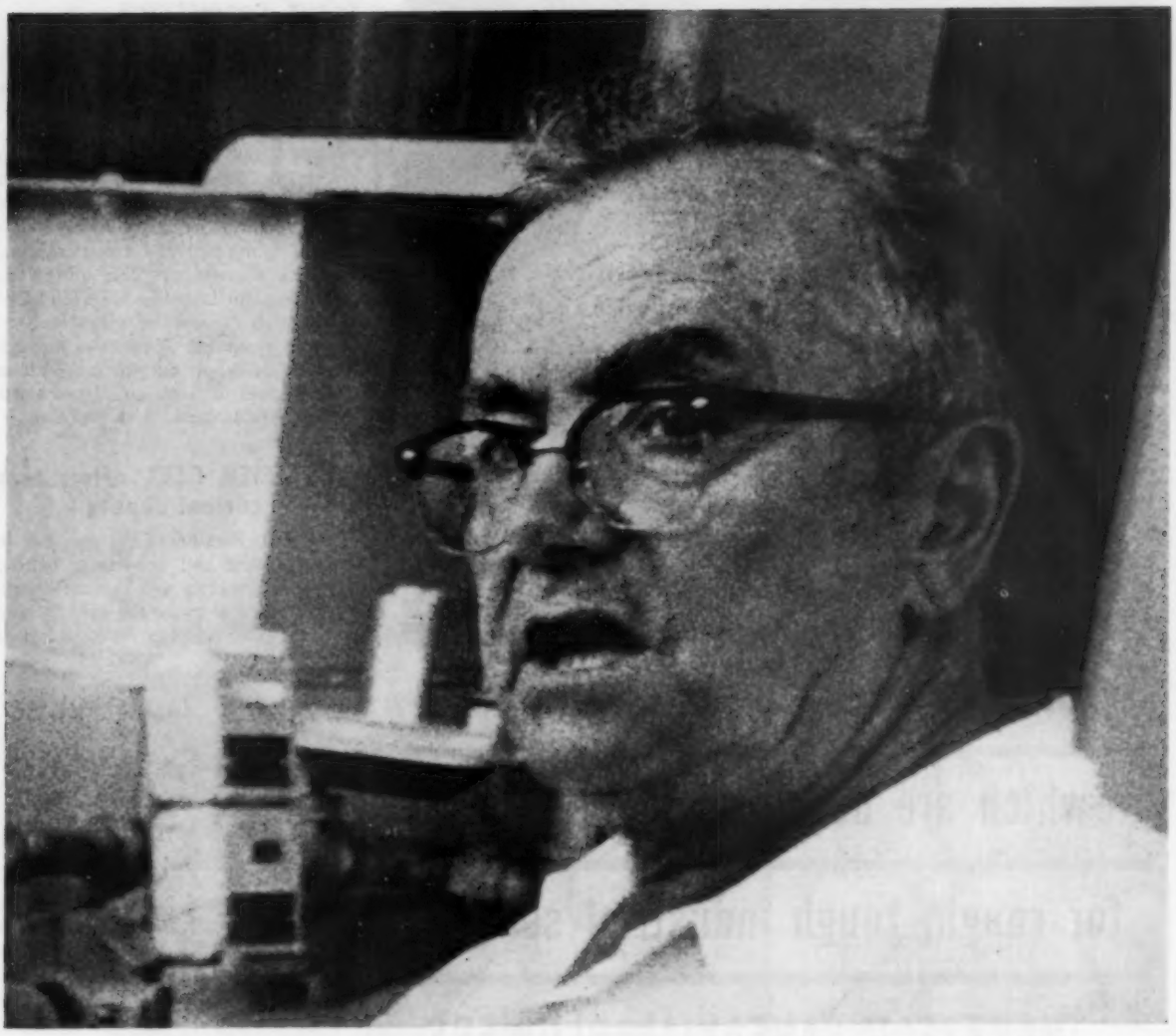
For details, circle 13 on Post Card

SPACE HEATER for use where air changes frequently

The Directflow Heater is a gas-fired unit for use where frequent air changes are necessary, particularly where noxious gases, acid fumes, dust or hot vapors are released as part of the manufacturing process and expelled by exhaust fans. The unit has no combustion chamber and handles only non-recirculating makeup air. Combustion occurs in the air stream, with resultant gases emitted into the plant with heated outside air. However, these gases represent less than 0.001 per cent of total volume, or less than 10 ppm.

Unit is available in seven models with air output capacity from 11,000





"Waste disposal is complete, smokeless, odorless, with our GAS-operated JOSEPH GODER INCINERATOR"

Fred Lodes, Stationary Engineer, Leo A. Daly Building, Omaha, Nebraska, adds: "Everything burnable gets completely destroyed in our Joseph Goder Gas Incinerator. We like the convenience of no bottom deposit. And the after-burner eliminates all smoke and odor."

Complete destruction of waste is of special interest to the Leo A. Daly Co.—a leading firm of architects, engineers and planners. They often work on classified Government projects. Discarded designs must be completely destroyed for security reasons. This is no problem at all with the Goder Gas Incinerator.

A patented Incline Step Grate staggers and spreads waste for a clean, smokeless fire. Gas flames consume everything burnable. Odors are snuffed out in the after-burner. You save money on labor, maintenance, refuse storage, refuse removal. And thrifty gas keeps fuel costs low.

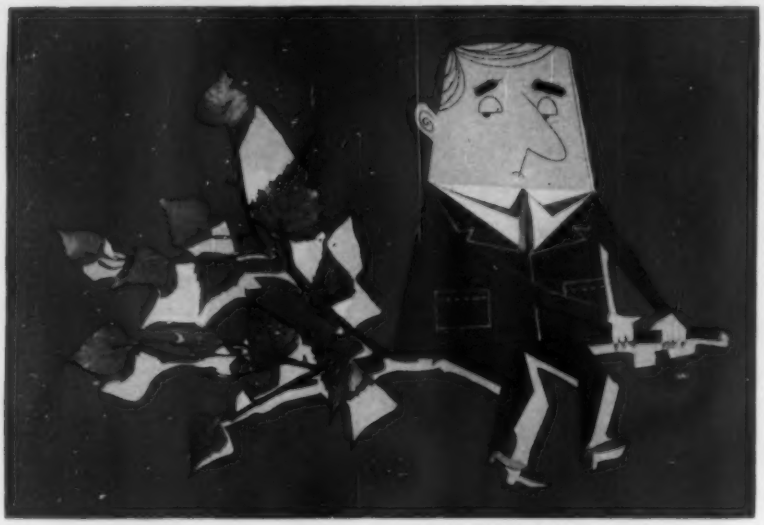
For complete, smokeless, odorless waste disposal, specify a Goder Gas Incinerator. Call your local Gas Company, or write Joseph Goder Incinerators, 4241 N. Honore St., Chicago 13, Ill. *American Gas Association*

A patented Foot Pedal Charging Door in the Joseph Goder Gas Incinerator insures safer, easier operation. Furnace volumes and grate area are accurately proportioned to burning capacity, fuel and type of waste.

FOR WASTE DISPOSAL GAS IS GOOD BUSINESS!

Circle 604 on postcard, page 33

Don't Get out on a LIMB...

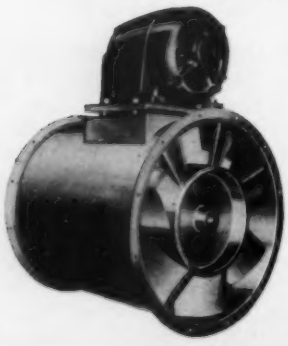


insist on the vaneaxial blowers

which are designed specifically

for rough, tough industrial service

...HARTZELL VANEAXIAL BLOWERS



Compare the specifications on Hartzell Vaneaxial blowers with those on other units of the same type. Note for instance the heavier gauge steel used on the Hartzell units, the heavier over-all construction, the fact that Hartzell welds the guide vanes to both the inner and outer shells. You'll quickly see why Hartzell vaneaxial blowers stand up better . . . last longer, require less maintenance. And Hartzell vaneaxial blowers are now available in eleven sizes, 12" to 60", including the one that's just right for your application.

Hartzell PROPELLER FAN COMPANY

Division of Clarke Hills Corp. • PIQUA, OHIO

KARTZELL

Circle 605 on postcard, page 33

PLANT ENGINEERING EQUIPMENT

(Begins on page 182)

cfm to 60,000 cfm and heat output to 6,750,000 Btu/hr, with maximum turndown ratio of 25 to 1. It can be equipped for indoor or outdoor installation. Only fuel and electrical connections are needed. The unit lends itself to plant layouts where tempered make-up air must be introduced to widely separated locations through smaller units or ductwork. Bulletin 580-14 gives information. Dravo Corp.

For details, circle 14 on Post Card

RECTIFIER CELL offers high current density

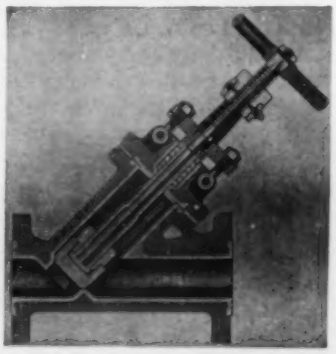
The Hi-I Rectifier Cell, for use in electroplating and anodizing, battery charging, welding and dynamic braking, is rated at twice the current density of conventional selenium cells

with no increase in forward voltage drop. Single cell sizes are available in current ratings from 200 ma half wave convection cooled to 33 amp half wave forced-air cooled. They are rated at 33 v a-c and any number can be put in series to get higher ratings. Westinghouse Electric Corp.

For details, circle 15 on Post Card

PLASTIC-LINED VALVE resists corrosive effects

Designed to combat destructive effects when controlling flow of corrosive fluids, this Y type metal valve has all wetted or inner parts and surfaces (inside surface of body and bonnet,



NEW BANTAM PUMP

...a boon to contractors

...utility crews!

an Ingersoll-Rand exclusive! NEW—automatic constant lubrication of water seals from a pressurized grease reservoir in the housing!

Ingersoll-Rand
Size 225 Air
Operated Sump Pump

An easy 34 lb. load for one man, and only 16 in. high, this new baby of the Ingersoll-Rand Pump Line can move 190 gallons per minute against a 15 ft. total head.

The new I-R 225 Pump is ideal for pumping water, oil, sewage or sludge out of sumps, trenches, manholes, tanks and bilges.

Other newly designed features include a more efficient and longer lasting multi-vane motor, stainless steel parts at critical locations to prevent corrosion, and a rugged alloy housing and impeller.

Standard equipment includes exhaust hose assembly, air strainer and air throttle valve.

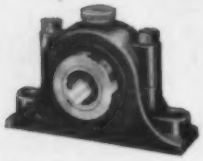
For details or an on-the-job demonstration, call your nearby Ingersoll-Rand representative or write: Ingersoll-Rand, 11 Broadway, New York 4, N. Y.

Ingersoll-Rand

11 Broadway, New York 4, N. Y.

219A-18

Circle 606 on postcard, page 33



DODGE PILLOW BLOCKS with TIMKEN BEARINGS

America's Quality Pillow Blocks!

TAPER-LOCK STEEL CONVEYOR PULLEYS

Maximum strength with minimum weight!

DODGE TAKE-UPS

Complete range of stock models, sizes.

●

Write for Bulletins!

- ✓ Rolling Bearings—ratings, data.
- ✓ Conveyor Pulleys—technical data.
- ✓ Take-Ups—Roller, Ball, Babbitted.

DODGE MANUFACTURING CORPORATION
2700 Union Street • Mishawaka, Indiana

DODGE
of Mishawaka, Ind.

PLANT ENGINEERING EQUIPMENT

(Begins on page 182)

stuffing box and stem) protected by heavy plastic lining. Choice of three plastic linings is determined by service for which valve is required, as well as pressure and temperature of corrosive fluid to be handled. Valves are cast carbon steel, but can be supplied in other alloys, in sizes 1 through 3 in. The Wm. Powell Co.

For details, circle 16 on Post Card

SAMPLE COOLER for hot, high pressure fluids

This sample cooler can be used for boiler water, steam, feedwater and hot chemical solutions. A counterflow type heat exchanger, it features rugged coil within a shell construction. The inner coil is Inconel seamless tubing in a seamless, stainless steel outer shell. Available with screwed or ½-in. socket welding adapter sample connections. Hagan Chemicals & Controls, Inc.

For details, circle 17 on Post Card

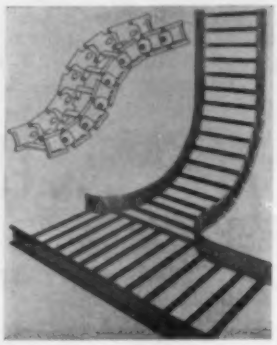
EPOXY FLOOR COATING comes already mixed

Sealaway, a single package epoxy coating in solution form, protects concrete wood, magnesite, cork, tile, linoleum and painted floors against traffic wear, deterioration and disintegration. Applied like paint, Sealaway penetrates to fill pores and voids. It hardens concrete and toughens wood, strengthening and reinforcing the flooring to form a tough, hard surface. Manufacturer says that Sealaway makes floors last longer, and look better, also cost less to maintain. The Hallemite Mfg. Co.

For details, circle 18 on Post Card

TRAY ELBOW flattens, saves shipping, storage space

Ladder-Way, a tray-supporting system for insulated power cables, features a vertical plane elbow of flat links, secured by Tinnerman fasteners inserted through one of three notches in each link and a single bolt hole in



the adjoining link. Hand-adjusted in the field to the angle and radius ordered, the elbow holds its shape. Ladder-way comes in 19-gage steel, pregalvanized or hot-dip galvanized after fabrication. Standard sections are 10 ft long, with inside depth of 3 in. Rungs have rounded edges, to lessen cable insulation wear, and spacings to 16 in. Delta Star Electric Div., H. K. Porter Co., Inc.

For details, circle 19 on Post Card

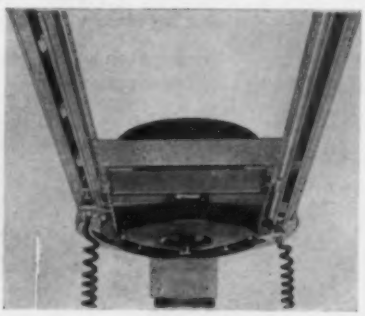
HAND CLEANER removes grime without water

Gee-Whiz is formulated to remove all types of soil from hands, including foundry "binder," grease, carbon, paint and other materials. The semi-solid cream-like material contains lanolin and hexachlorophene. It comes in 1-gal cans designed for insertion in company's single-stroke dispensers. A sample is available. G. E. Smith, Inc.

For details, circle 20 on Post Card

COMPACT POWER SYSTEM synchronizes conveyor movement

This motor driven power system provides electrical power outlets whose movement can be synchronized with movement of conveyor for mass production assembly and electrical testing. Continuity checks, alignment, cold test runs, etc. can be performed "on the move." System consists of two parallel track runs, one electrified and one not, through which current-collector trolleys are uniformly moved by means of a chain. A disc wheel at one end driven by variable speed drive, reverses chain and trolleys to non-electrified track section, keeping trolleys in continuous motion. Speed is adjustable from zero to 50 fpm. Capacity is 60 amp, 300 v a-c or d-c. Feedrail Corp.



For details, circle 21 on Post Card

(Continued on page 190)

TERRIFIC!

— and how long will the flexing member last?

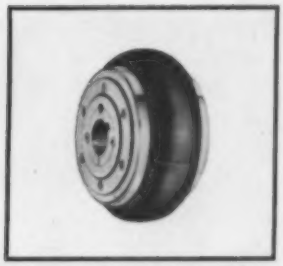
Good question. The heart of Para-flex is a tire with synthetic tension members bonded together in rubber—which provides a flexing body that automatically compensates for *all combinations* of misalignment and end float, and absorbs vibration as well!

This amazing coupling has now been used in American industry 4 years. Thousands are in operation—in steel mills, paper mills, oil fields, mines, quarries, chemical plants, everywhere—and in these 4 years, replacements of elements have been negligible.

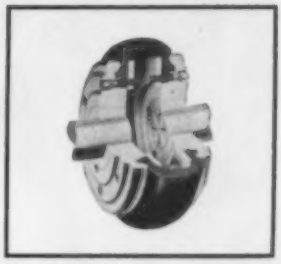
Dodge Standard Para-flex takes angular misalignment up to 4°, parallel misalignment up to ⅛" and end float up to 5/16" depending upon the size of the coupling and the duration of shaft displacement.

Dodge Para-flex is available in 3 types—Standard, Flywheel and High Speed (shown at right). The Standard type is stocked in capacities up to 3640 hp at 910 rpm. Ask your Dodge Distributor, or write us for complete technical bulletin.

Dodge Manufacturing Corporation, 2700 Union Street, Mishawaka, Indiana



The new idea in flexible cushion couplings, with a flexing member that "swallows up" misalignment.



No lubrication, no maintenance. Replace flexing element without moving driver or driven machine.

Flywheel and High Speed Types. For use with motors and internal combustion engines turning up to 5230 rpm.

The Products with the Pluses...

DODGE

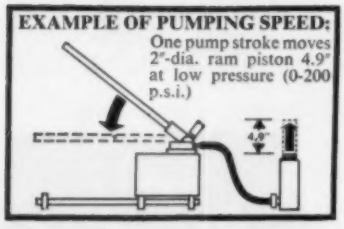
of Mishawaka, Ind.

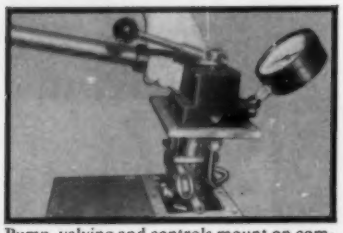
DODGE

Para-flex

CALL THE TRANSMISSIONEER, your Dodge Distributor. Look under "Dodge Transmissioneer" in the *white* pages of your phone book. Factory trained he can give you valuable assistance.

Get fast ram approach, save time with new 2-speed hydraulic pump





Pump, valving and controls mount on common cover plate; use with other reservoirs.

- **Delivers a big 7.35 cu. in. of oil per stroke at low pressure (0 to 200 p.s.i.)**
- **Delivers .294 cu. in./stroke from 200 to 10,000 p.s.i. for high force requirements**
- **For operating both single and double-acting cylinders**

Here is a compact, precision-built 10,000 p.s.i. 2-speed hand pump with the ability to deliver exceptionally high volume at low pressure for fast ram approach and return. Handle high-force requirements, yet waste no time getting the ram to the work! Choice of 2-way or 4-way control valve, mounted easily on cover plate; no exposed piping. Unit weighs only 34 lbs.

Ask your OTC distributor about the new OTC "Dualmaster" pump.

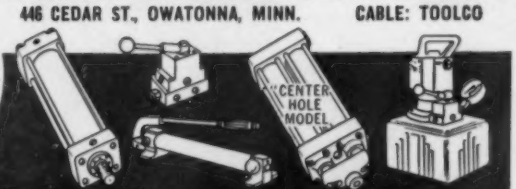
PRECISION HYDRAULICS DIVISION

OWATONNA TOOL CO.

446 CEDAR ST., OWATONNA, MINN. CABLE: TOOLCO

RESEARCH · ENGINEERING · DEVELOPMENT

OTC



DESIGNERS AND MANUFACTURERS OF QUALITY HIGH PRESSURE HYDRAULIC COMPONENTS

Circle 608 on postcard, page 33

PLANT ENGINEERING EQUIPMENT

(Begins on page 182)

SKYHOOK for small area, limited ceiling strength

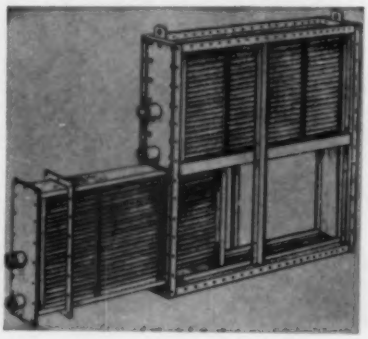
Magic-Pole Adjustable Tripod has three telescoping legs, with 6-ft height adjustment, which can be raised separately and positioned in any angle. It folds compactly, carries easily, and needs no special tools. Each leg is

equipped with a spring-loaded bolt and a base plate on a universal joint. Spiked feet and mud plates are optional. The unit is weatherproof. Nine models with a maximum 17-ft, height, 9000 lb capacity are available, also an aluminum alloy model weighing 36 lb, able to lift to 1½ tons. B. E. Wallace Products Corp.

For details, circle 22 on Post Card

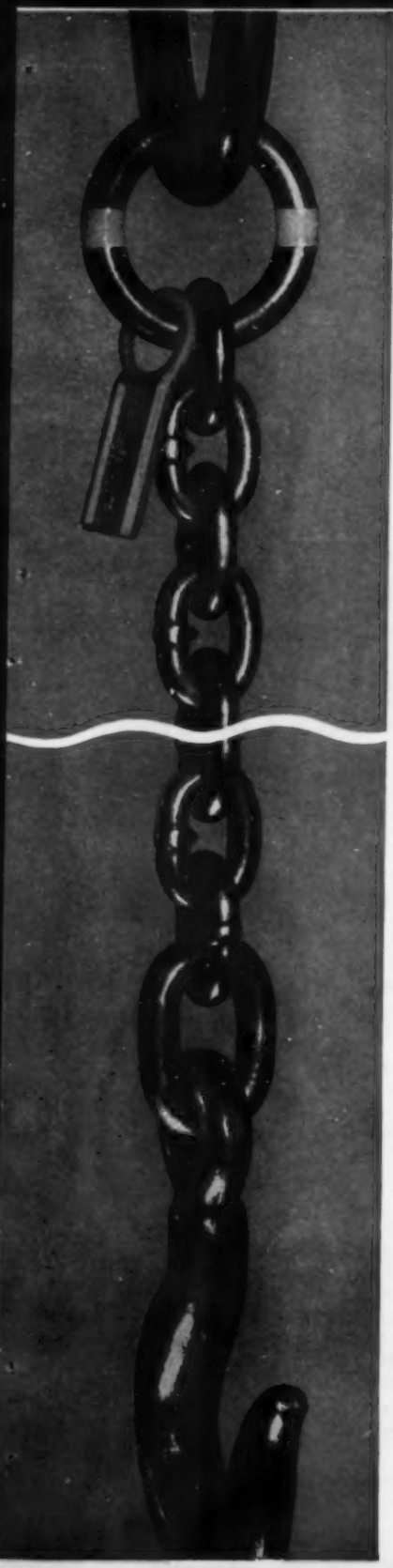
AIR COMBUSTION HEATERS in packaged assemblies

For installation in ductwork breechings, these air combustion heaters feature removable core coils and Aerofin tubing. They come in packaged assemblies, ready for mounting ahead of or behind forced air fans. Rigid steel casings and tube supports prevent coil deflection, and guide angles speed insertion or removal of coils. Coils are pitched in casting for horizontal or vertical air flow, to provide proper condensate drainage and prevent freez-



NEW and REVOLUTIONARY...

SLING CHAINS THAT TALK



The WARNING RING* on Campbell SENTRY SLINGS tells you immediately when the sling has been overloaded . . . it elongates visibly . . . and before the chain itself is damaged.

Your eye can see the difference!

Ring remains round
Sling used properly

Ring distorted
Sling overloaded

New, revolutionary . . . Campbell **SENTRY SLINGS**—fully tested for over a year by foundries, steel fabricators and heavy equipment manufacturers, offer many important advantages. The **WARNING RING** is stronger than the chain itself. Yet it changes shape as the sling is overloaded . . . *before permanent damage occurs.* Repair is quick and easy, with a new **WARNING RING** replaced at the factory. Re-tested and re-certified Sentry Slings are again ready for regular service.

Here's How You Benefit From New SENTRY SLINGS:

- Safety programs are easier to maintain—with the **WARNING RING**'s built-in safety that protects men and material!
- Lower repair costs give larger savings than ever—normally only the **WARNING RING** will need repair!
- Immediate visual evidence of overload means easier inspection—even while sling is in use!

SENTRY SLINGS, available in all types, are made from Cam-Alloy steel chain only and are available at no extra cost! All slings carry the Campbell Guarantee and Certificate of Test.

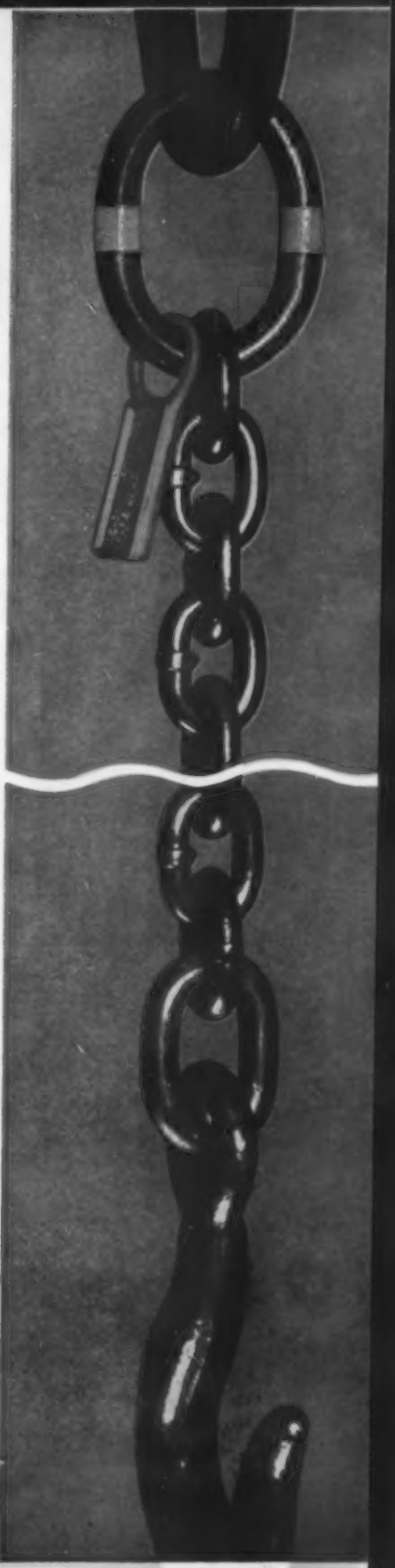
CAMPBELL with the WARNING RING SENTRY SLING

CAMPBELL CHAIN *Company*

FACTORIES: York, Pa.; West Burlington, Iowa; Union City, Calif. WAREHOUSES: East Cambridge, Mass.; Atlanta, Ga.; Dallas, Texas; Chicago, Ill.; Portland, Ore.; Seattle, Wash.; Los Angeles, Calif.

*Pat. No. 2966878

Circle 609 on postcard, page 33



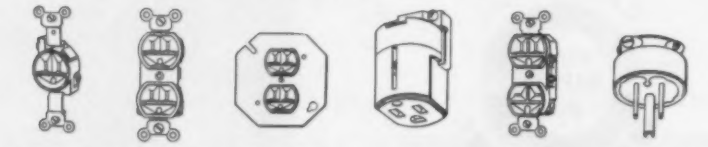
G-E Grounding Outlets simplify work for maintenance men.

1. Look — two 20A branch circuits with the flick of a screwdriver. You just remove breakoffs in this GE4108 Specification Grade Grounding Outlet, to get two circuits from a 3-wire, 120/240V service or from separate 120V circuits. Outlet accepts four types of caps, too.

2. You get eight back-wiring holes, with pressure-clamp terminals for Nos. 14, 12 or 10 Awg wires — plus four side wiring screws — two grounding screws.

3. Sturdy Construction, with double wipe contacts; "through" strap; captive mounting screws. 20A, 125V; U.L.-listed; meets Federal and REA specifications.

Get the "maintenance man's line" of grounding outlets and other wiring devices! Call your G-E distributor. General Electric Company, Wiring Device Department, Providence 7, Rhode Island.



15A, 125V, 250V | 15A, 125V, 250V, 277V 20A, 125V | 15A, 125V, 250V | 15A, 125V, 250V | 15A, 125/250V | 15A, 125V, 250V, 277V 20A, 125V

Progress Is Our Most Important Product

GENERAL ELECTRIC

Circle 610 on postcard, page 33

PLANT ENGINEERING EQUIPMENT

(Begins on page 182)

ing. Coil tubes withstand temperatures to 700 F. Steam heating coils are available with ⅝- or 1-in. OD copper tubing. Bulletin FD 800 gives details. Buffalo Forge Co.

For details, circle 23 on Post Card

Use the Reader Service Cards provided on pages 33-34 to ask for more information on this equipment. Circle item numbers of products in which you are interested.

ELECTRIC WELDER works on most plastic items

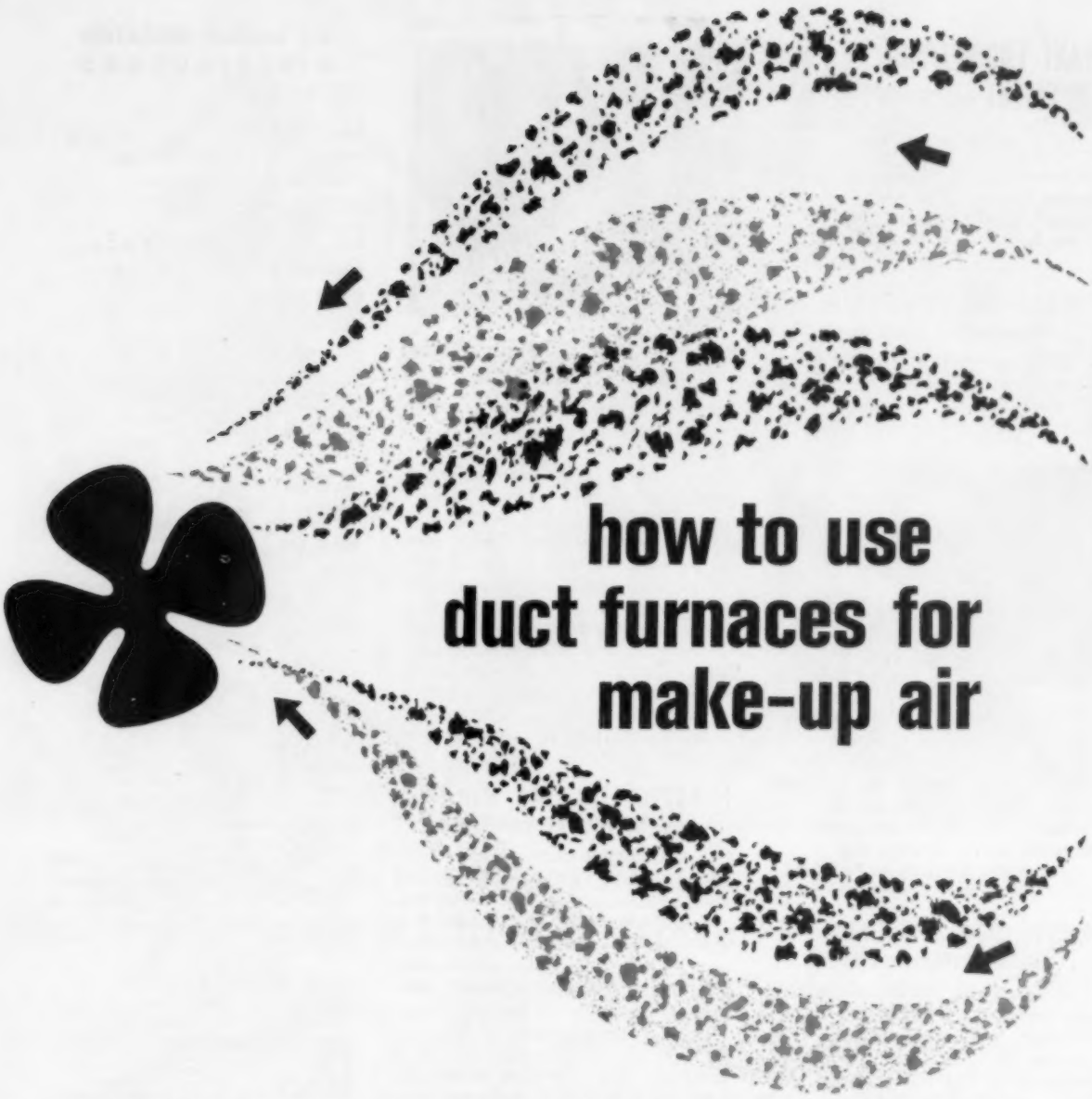
Problems in fabrication, installation or maintenance of plastic items can be handled with the Electric Plastic Welder. It is designed to weld most

thermoplastics, including plasticized vinyl tank linings, unplasticized rigid polyvinyl chloride, polyethylene and polypropylene. Butt welds, lap welds, curved welds and others are possible. Lightweight (14 oz) welder operates on 110 v a-c, offers choice of temperatures. Seelye Plastic-Fab, Inc.

For details, circle 24 on Post Card

PUMP for process liquids to 350 F, 250 lb pressure

Series 300 (Type BHO) Pumps are end suction centrifugal units engineered to handle process liquids, clear or with suspensions. Fourteen-sizes, from 1 to 5 in., are offered. Larger sizes can be close-coupled using motors with NEMA shaft extensions. Outstanding features announced are liberal packing areas, heavy mechanical construction and external dimensions. Two-bolt glands are standard; four-bolt glands with quenching can be provided. Two frame types are available. The smaller has a four-bolt foot



how to use duct furnaces for make-up air

Free from Reznor: Learn about this profitable use of duct furnaces along with other valuable information on make-up air in our just published handbook "What to Consider in Designing Make-Up Air Systems."

Manufacturing plants, chemical, food and material processors, restaurants, bakeries and dry cleaners are becoming increasingly aware of the need for make-up air. They now realize that bringing in clean, heated replacement air through a duct furnace can prevent undesirable drafts and the infiltration of dust, dirt and fumes.

Reznor's handbook on make-up air is one of a new series of Reznor Heating Handbooks to help you solve commercial and industrial heating problems. For your copy, published by the world's largest manufacturer of gas unit heaters, fill in the coupon and mail to Reznor. Or, for more information, call your Reznor distributor or nearby Reznor district office listed in the Yellow Pages under "Heaters—Unit."

REZNOR HEATERS

REZNOR MANUFACTURING COMPANY
Dept. **PE-9,** Mercer, Pennsylvania
Send me a copy of "What to Consider in Designing Make-Up Air Systems."

name _____ title _____
company _____
address _____
city _____ state _____

Circle 611 on postcard, page 33

PLANT ENGINEERING EQUIPMENT

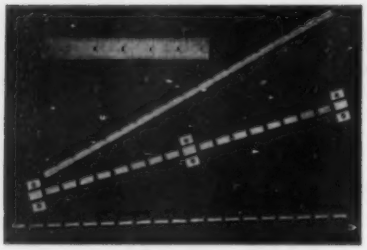
(Begins on page 182)

and is machine registered to volute and bearing housing. The larger has extra support. C. H. Wheeler Mfg. Co.

For details, circle 25 on Post Card

VIBRATION DAMPER in easily-applied strip form

Strip-Damper is an easily-applied vibration damping device to minimize vibration response of such structures as air frame components, electronic



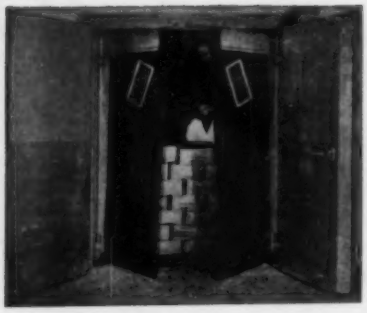
chassis, air ducts, and shock and vibration test fixtures. Weighing less than 1½ oz, including clips, damper is 11¾ in. long, may be cut to shorter lengths. Attaching clips may be riveted or bolted in place, or epoxy glue may be used. Barry Wright Corp.

For details, circle 26 on Post Card

RUST, SCALE REMOVER cleans stainless steel

Bull Frog Scale Off 104 comes in dry powder form and is claimed safe and effective in cleaning of compressor jackets, condensers, steam boilers, heat exchangers, and ion exchange resin beds. Berman Chemical Co.

For details, circle 27 on Post Card



RUBBER DOORS serve "open door" traffic areas

For use in refrigerated areas, these flexible, self-closing rubber doors are basically auxiliary doors to serve where standard doors must be left open because of traffic activity. Clearance space at top and sides of doors is closed with 1/16-in. thick flexible rubber air seals. Of duck-reinforced rubber with heavy-duty frame and hardware, doors have shatterproof windows, self-returning cam hinge and auxiliary closing devices—adjustable compression springs or single-acting torsion springs. Magnet closure is optional W. B. McGuire Co., Inc.

For details, circle 28 on Post Card

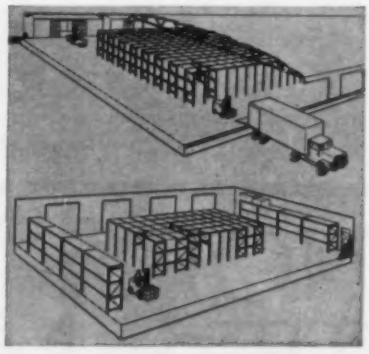
PLASTIC DRAIN PIPE is tough, resists corrosion

Of ultra-high-impact plastic, S/D Sewer Drain Pipe is resistant to acids, alkalies, greases, oils, detergents and soil conditions. The compound is developed to provide a tough, corrosion resistant, root proof, non-absorbent, low priced pipe. Claimed comparable in quality to highest priced compounds being used in severe service pipe, it comes in diameters of 2 and 6 in.; lengths of 10 to 20 ft. Consolidated Pipe Co. of America

For details, circle 29 on Post Card

RACKS for high-density storage of palletized items

These "drive-in" and "drive-thru" storage racks allow floor space to be covered by racks while giving fork lift trucks full access to stored items. Of standard, pre-fabricated parts for custom installation, components include vertical frames of 3-in. square column and 1½-in. square diagonal tie-members, rail support arms and 3-in. square support rails to hold the pallets, plus ceiling supports and cross-bracing members. Rail support arms and rails are locked in place with two button-head studs and a safety load lock. Rails are held in place by another stud and safety lock bolt. Support arms



can be adjusted to allow maximum use of space. Acme Steel Co.

For details, circle 30 on Post Card

(Continued on page 196)

G-B BLANKET INSULATION DISTRIBUTORS

AKRON, Ohio, The Asbestos Supply Co.
ALBANY, Ga., Industry Insulation Co.
ALBANY, N. Y., Hudson Valley Asbestos Corp.
ALBUQUERQUE, N. M., Mt. States Insulation Co.
AMARILLO, Tex., McDonald Engineering & Insulating Co.
Morrison Supply Co.
ANDERSON, S. C., Building Material & Equipment Co.
AUGUSTA, Ga., The Noland Co.
ATLANTA, Ga., Reynolds Aluminum Supply Co.
Parker-Rico Insulation
AUSTIN, Tex., Cinbar Engineering Co.
BALTIMORE, Md., Leroy Insulation Co.
BANGOR, Me., Eastern Glass Co.
BATON ROUGE, La., Eagle Asbestos & Packing Co.
BEAUMONT, Tex., Coburn Supply Co., Inc.; Solar Supply Co.
BILLINGS, Mont., Big Horn Supply, Inc.
BIRMINGHAM, Ala., Reynolds Aluminum Supply Co.
Shook & Fletcher Supply Co.
BORGER, Tex., Western Chemical & Supply Co.
BOSTON, Mass., Homans-Kohler, Inc.
BRIDGEPORT, Conn., Robert A. Keasbey Co., Inc.
BRUNSWICK, Ga., Baker Bros., Inc.
BUFFALO, N. Y., Industrial Insulation Sales, Inc.
BURLINGTON, Vt., Pipe Insulators, Inc.
CHAMPAIGN, Ill., The Lewie-David Co.
CHARLESTON, S. C., Baker Bros., Inc.
CHARLESTON, W. Va., Asbestos & Insulating Co.
CHARLOTTE, N. C., D & B Insulation Co.
CHATTANOOGA, Tenn., The Noland Co.
CHICAGO, Ill., E. C. Carlson Co.; Culberg Asb. & Cork Co.
CHRISTOPHER, Ill., Hoe Supply Co.
CLEVELAND, Ohio, Ohio Asbestos & Insulation Co.
COLUMBUS, Ohio, Santeler Brothers
Culberg of Ohio
CORPUS CHRISTI, Tex., Precision Insulation Co.
DALLAS, Tex., Acme Insul. & Sup. Co.; Payne Ladewig, Inc.
Electrical Supply Co.
DAVENPORT, Iowa, Republic Electric Co.
DAYTONA BEACH, Fla., B & F Insulation Co.
DECATUR, Ill., The Lewie-David Co.
DENVER, Colo., Plateau Sup. Co.
DES MOINES, Iowa, Iowa Asbestos Company, Inc.
DETROIT, Mich., The Walter Rankin Co.
EL PASO, Tex., Insulation & Specialties, Inc.
M & M Refrigeration & Supply Co.
ERIE, Pa., Laco-McMullen Co.
EVANSVILLE, Ind., Geo. Koch Sons., Inc.
FALCONER, N. Y., Laco Roofing
FT. SMITH, Ark., Ball Distributing & Engineering Co.
FT. WAYNE, Ind., M. H. Hilt, Inc.
FT. WORTH, Tex., Bracken Co.
GAINESVILLE, Fla., Baker Bros., Inc.
GRAND RAPIDS, Mich., M. S. Knee Co.
GREENSBORO, N. C., Starr Davis Co., Inc.
GULFPORT, Miss., Paine Supply Co.
HONOLULU, Hawaii, Parker-Fallis Insulation Co., Inc.
HOUSTON, Tex., Precision Insulation Co.
INDIANAPOLIS, Ind., Lyon Lumber & Supply Co.
IRON MOUNTAIN, Mich., Champion, Inc.
JACKSON, Miss., Paine Refrigeration Supply Co.
JACKSONVILLE, Fla., Baker Bros., Inc.; Eckles Dist., Inc.
Forber Sheet Metal Works; Reynolds Alum. Sup. Co.
JOPLIN, Mo., Joplin Cement Co.
KANSAS CITY, Mo., Central Sup. Co.; Kelly Asbestos Prod.
Insulation & Acoustical Specialties Co., Inc.
KEWANEE, Ill., Mechanical Insulation Co., Inc.
KINGSPORT, Tenn., Willis Supply Kingsport, Inc.
KNOXVILLE, Tenn., Willis Supply Co.
LAKE CHARLES, La., Coburn Sup. Co., Inc.; Solar Sup. Co.
LOS ANGELES, Calif., Accurate Insulation Co., Inc.
Western Fibrous Glass Products Co.
LOUISVILLE, Ky., General Insulation & Roofing Co.
LUBBOCK, Tex., Mechanical Equip. Co.; Morrison Sup. Co.
MACON, Ga., Industry Insulation Co.
MARIETTA, Ohio, Asbestos & Insulating Co.
MEMPHIS, Tenn., J. A. Denie's Sons Co.; Gibbons Sup. Co.
Miami, Fla., Reynolds Aluminum Supply Co.
Industrial Insulators, Inc.
Southern Metal Products Co.
MILFORD, Ohio, Insulation Contr. & Sup. Co.
MILWAUKEE, Wisc., F. R. Dengel Co.
MINNEAPOLIS, Minn., Asbestos Products, Inc.
MOBILE, Ala., Shook & Fletcher Insulation Co.
MONTGOMERY, Ala., Shook & Fletcher Supply Co.
MOORHEAD, Minn., Fargo-Moorhead Insulation Co.
NASHVILLE, Tenn., Reynolds Aluminum Supply Co.
NEWARK, N. J., Eastern Steam Specialty Co.
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NEW ORLEANS, La., Eagle Asbestos & Packing Co.
NEW YORK, N. Y., Eastern Steam Specialty Co.
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ODESSA, Tex., Western Chemical & Supply Co.
Morrison Supply Co.
OKLA. CITY, Okla., Ball Distributing & Engineering Co.
OMAHA, Nebr., Cardinal Supply & Mfg. Co.
ORANGE, Conn., Insulation Supply Co.
ORLANDO, Fla., Baker Bros., Inc.
PADUCAH, Ky., Triangle Insulation Co.
PASCAGOULA, Miss., Shook & Fletcher Insulation
PHILADELPHIA, Pa., John F. Scanlan, Inc.
PHOENIX, Ariz., Williams Insulation Co.
PITTSBURGH, Pa., Dravo Corp., Keystone Div.
PORT ARTHUR, Tex., Coburn Supply Co.
PORTLAND, Me., Eastern Glass Co., Inc.
PORTLAND, Ore., Western Fibrous Glass Products Co.
RALEIGH, N. C., Reynolds Aluminum Supply Co.
RAPID CITY, S. D., Robbins & Stearns Wholesale
RED BANK, N. J., Altex Pipe & Supply Co.
RICHMOND, Va., Reynolds Aluminum Supply Co.
ROANOKE, Va., C. E. Thurston Co.
ROCKFORD, Ill., Mott Brothers Co.
SACRAMENTO, Calif., The Brookman Co.
SALT LAKE CITY, Utah, Bullough Asbestos Sup. Co.
SAN ANTONIO, Tex., San Antonio Machine & Supply Co.
SAN DIEGO, Calif., Western Fibrous Glass Products Co.
SAN FRANCISCO, Calif., Western Fibrous Glass Prod. Co.
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SAVANNAH, Ga., Baker Bros., Inc.; Reynolds Alum. Sup. Co.
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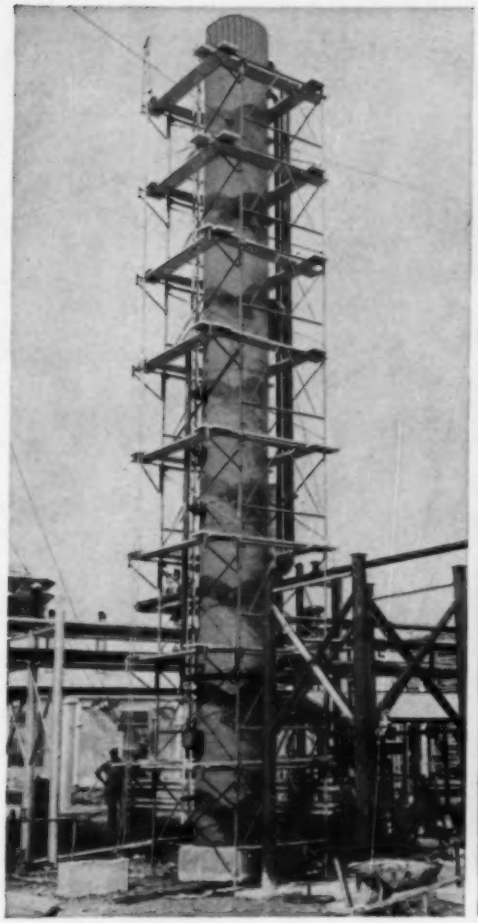
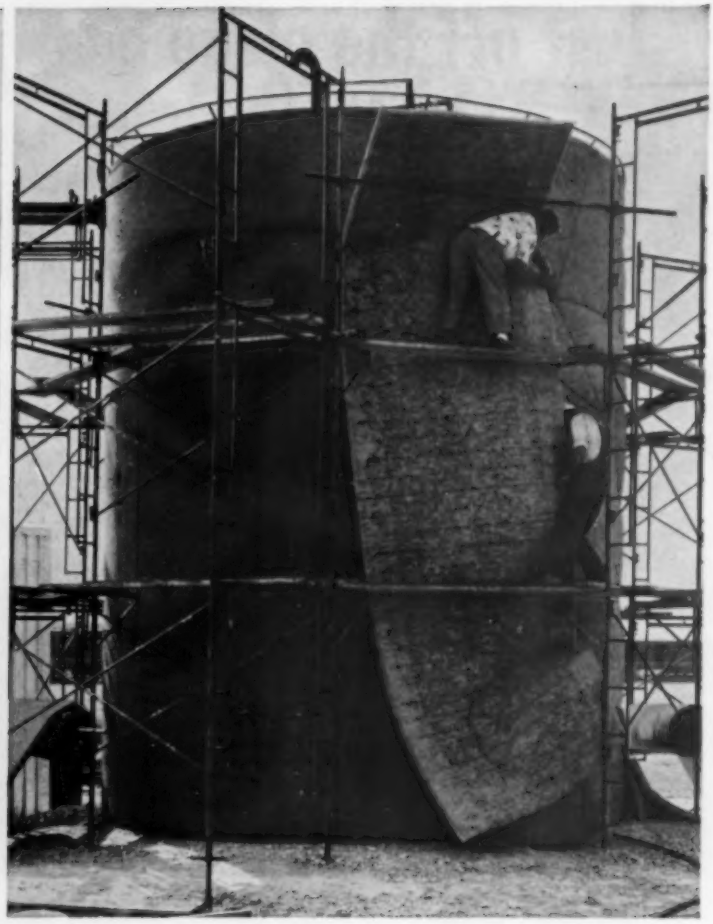
SHREVEPORT, La., Frith Sales Co.
SOMERVILLE, Mass., Insulation Products, Inc.
ST. LOUIS, Mo., Refrigeration Supplies, Inc.
ST. PAUL, Minn., Asbestos Products, Inc.
SYRACUSE, N. Y., Burnett Process, Inc.
TALLAHASSEE, Fla., Baker Bros., Inc.
TAMPA, Fla., Eagle Roofing & Art Metal Works, Inc.
TULSA, Okla., Ball Distributing & Engr. Co.
TUPELO, Miss., Paine Supply Co.
VALDOSTA, Ga., Baker Bros., Inc.
WASHINGTON, D. C., Walter E. Campbell Co., Inc.
WAYCROSS, Ga., Baker Bros., Inc.
WEST PALM BEACH, Fla., Southern Metal Prod. Co.
WICHITA, Kans., Wichita Sheet Metal, Inc.
7-24-61





The fastest, most economical way to insulate tanks and towers: Ultralite® Glass Fiber Blankets

NO SPECIAL BANDING OR STRAPPING—Made exclusively of long, strong textile-type glass fibers that have ten times the tensile strength of steel fibers of the same diameter, Ultralite can easily support many times its own weight without special bands or straps.

FEWER MAN-HOURS FOR INSTALLATION — With continuous blankets up to 10′ wide you can cover, in one quick operation, a 10′ wide area from the top to the bottom of the tank. (Compare this to the man-hours it takes with blocks, boards or other fiber glass products in small sheets!) Ultralite is lightweight and easy to handle—1000 sq. ft. of 2″ Ultralite #75 weighs only 125 lbs.

OFTEN REQUIRES LESS THICKNESS — Ultralite's low "k" factor (.27 at 75° m.) allows you to save in another way. It takes less thickness of Ultralite to provide the same overall insulating efficiency of many other insulation materials. And with 10′ wide blankets there are fewer joints —a primary source of heat loss or gain with other insulation materials.

PERMANENT AS GLASS ITSELF — Ultralite's glass fiber composition does not rot, corrode, support mildew or vermin, or otherwise deteriorate. Because of its unique ruggedness, it is virtually immune to damage during and after installation. In fact, Ultralite can even be reused with no loss of thermal efficiency or permanence.

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Thermal and acoustical glass fiber insulations . . . Molded glass fiber pipe insulation . . . Couplings and fittings for plain and grooved end pipe

Circle 612 on postcard, page 33

Just off the plane and HERE COMES YOUR LUGGAGE

Turntables in incoming domestic flight area at Montreal International Air Terminal. The 80-foot perimeter of each slowly rotating luggage dispenser provides adequate space for passengers to identify and claim their luggage.

AN AIR TRAVELER'S DREAM COME TRUE!

You have just stepped off a plane with other jet-age travelers, and already an intricate system of belt conveyers, vertical hoists and turntables has been set in motion. The object—to get your luggage to you as quickly and as smoothly as possible—without confusion or delay. This is a good example of outstanding performance—the extra you get in Mathews Conveyers.

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MATHEWS

Over Fifty Years of Leadership in Mechanized Handling

Circle 613 on postcard, page 33

PLANT ENGINEERING EQUIPMENT

(Begins on page 182)

NAIL-LESS BRIDGING for wood joist construction

Contac Nail-Less Bridging speeds wood joist construction. It installs in a third less time, according to manufacturer. It is installed in pairs, from

above or below, before or after sheathing. It tightens in the presence of wood shrinkage, making bridging more secure. Of heavy, 16-gage by 1-in. steel in angle form, the bridging comes in stock sizes for joists 2-by-8 in. to 2-by-16 in., with spacing for 12, 16, 24 in. Concrete Tie and Anchor Co.

For details, circle 31 on Post Card

FLANGE TYPE PULLER is two-way, three-way tool

No. 518 is a two-way, three-way flange type puller designed to remove gears etc. having two or three tapped holes.

It handles bolt-circle diameters of 1½ to 4⅝ in., consists of puller body, forcing screw, plug, and six hex head cap screws. Owatonna Tool Co.

For details, circle 32 on Post Card

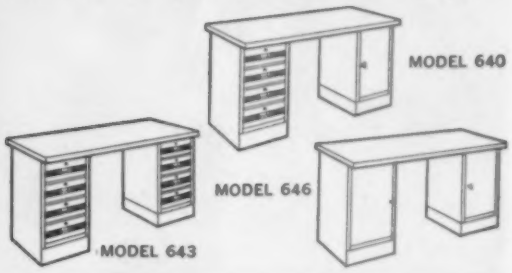
MOTOR STARTER requires less floor space

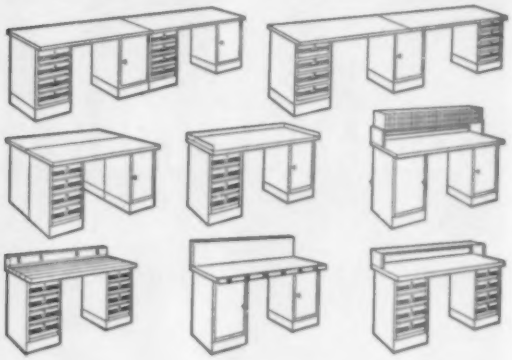
For use in air conditioning, this reduced voltage autotransformer starter is a Size 6 controller only 90 in. high, 36 in. wide and 28 in. deep. A former design of the same height was 68 in. wide, 42 in. deep. The size

HALLOWELL

UNIT WORK BENCHES

more efficient—for every job





HALLOWELL Unit Work Benches, with interchangeable accessories, allow you to rearrange or add units for changing work requirements. Work flows smoother . . . your shop stays neater . . . when you equip with rugged, long-life Hallowell Benches. Widest selection of sizes and accessories in the industry. Order from your local distributor's stock. No long wait for delivery. Mail coupon for complete catalog.

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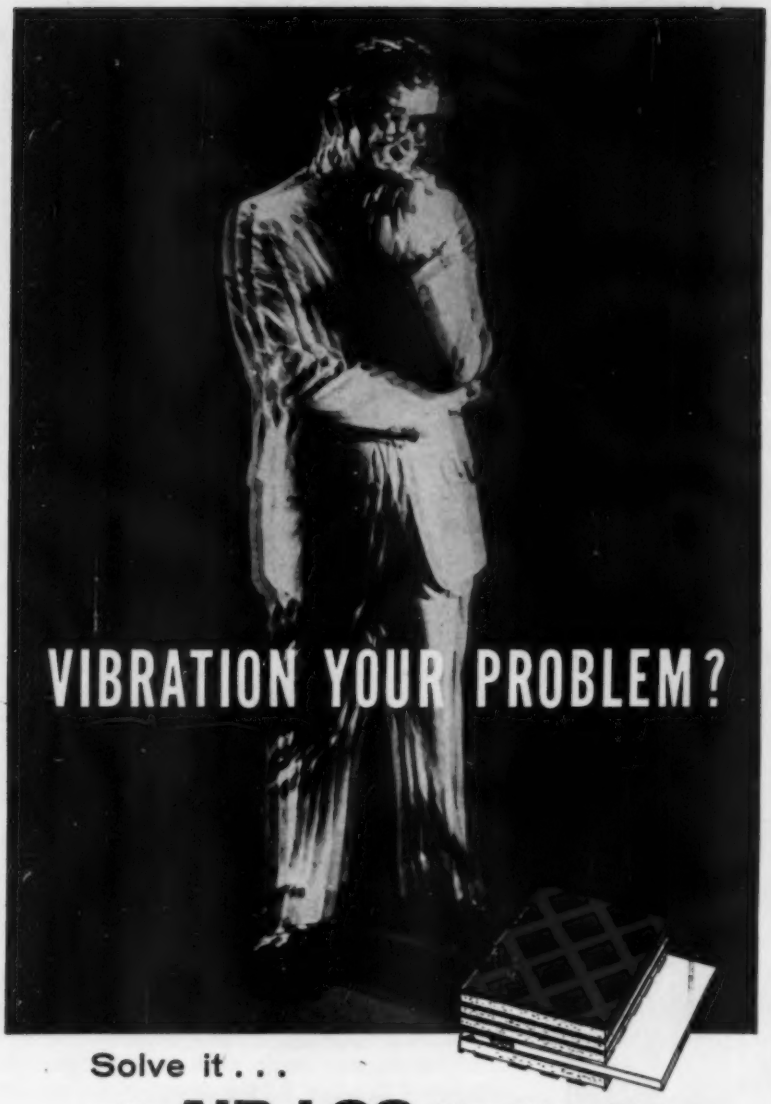
where reliability replaces probability

Circle 614 on postcard, page 33



Solve it . . .

with **AIR-LOC** Mounting Pads

For isolating and dampening vibration, Air-Loc is the answer. In actual production tests, it successfully reduces vibration up to 85%. Air-Loc is easy to install in a matter of minutes. It can be quickly shimmed for leveling, gives permanent machine alignment . . . and is re-usable.

The scientific cross-grid embossing of Air-Loc machinery pads literally anchors your machines to the floor . . . without cement, without bolts.

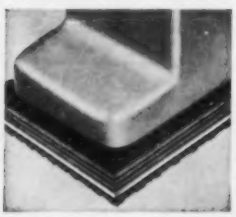
Air-Loc is made of three materials, and each plays its part in giving you the ultimate in easy, yet positive machine mounting:

Cork — absorbs vibrations, shock and noise. The cork used in Air-Loc is specially processed, under patents, to bring out its best physical properties.

Sisal Fibre — selected long-fibred sisal adds strength and stability.

Vinyl — completely surrounds the cork and sisal to give exceptional durability and permanent resistance to oils, alkalies and acids.

Write today for full information and sample.



Air-Loc® DIVISION

Clark, Cutler, McDermott Co.

115 WEST CENTRAL ST. • FRANKLIN, MASS.

Circle 615 on postcard, page 33

PLANT ENGINEERING EQUIPMENT

(Begins on page 182)

reduction of this hermetic compressor motor starter is made possible by small size contactors rated 600 v, 600 amp for either front or rear connected, and mounted on a steel panel 19¼ in. wide, 13¾ in. high and 8 in. deep. Westinghouse Electric Corp.

For details, circle 33 on Post Card

HAND CHAIN HOIST has spiroid gear transmission

Greater power and increased load control due to spiroid gear transmission are announced for these portable, aluminum hand chain hoists. The CB

Series Porta-Hoist is available in 11 models, with rated capacities from ½ to 12 tons. Faster hoisting and unusual maneuverability are reported. Spiroid gearing also has a safety advantage because of greater multiple tooth engagement. Full load control is provided by brake. Coffing Hoist Div., Duff-Norton Co.

For details, circle 34 on Post Card

PROCESS SYSTEMS for sensitivity measurement

The Qualicon Liquid Density Gauge provides continuous measurement of the density of a solution or slurry in a process pipe without contacting the material and moving parts. This increases the operation effciency of diversified processes, decreases manpower and improves quality. Applications include solids control, detection of pipeline interfaces and acid concentration control. Measurements are reported accurate to 0.0001 specific gravity units. The gage is designed for immediate integration into existing plant processes without disruption of facilities or production. The measuring head is attainable in two

designs, the Duo-unit and the Mono-unit for installation on pipes or tanks. Nuclear-Chicago Corp.

For details, circle 35 on Post Card

PLASTIC COATED VALVES handle abrasives, corrosives

Internal body surfaces of these resilient-seat steel gate valves have a baked-on plastic coating called EValcoat—a formulation of phenolic, epoxy and other resins. The valves are suitable for chemical, cement and other

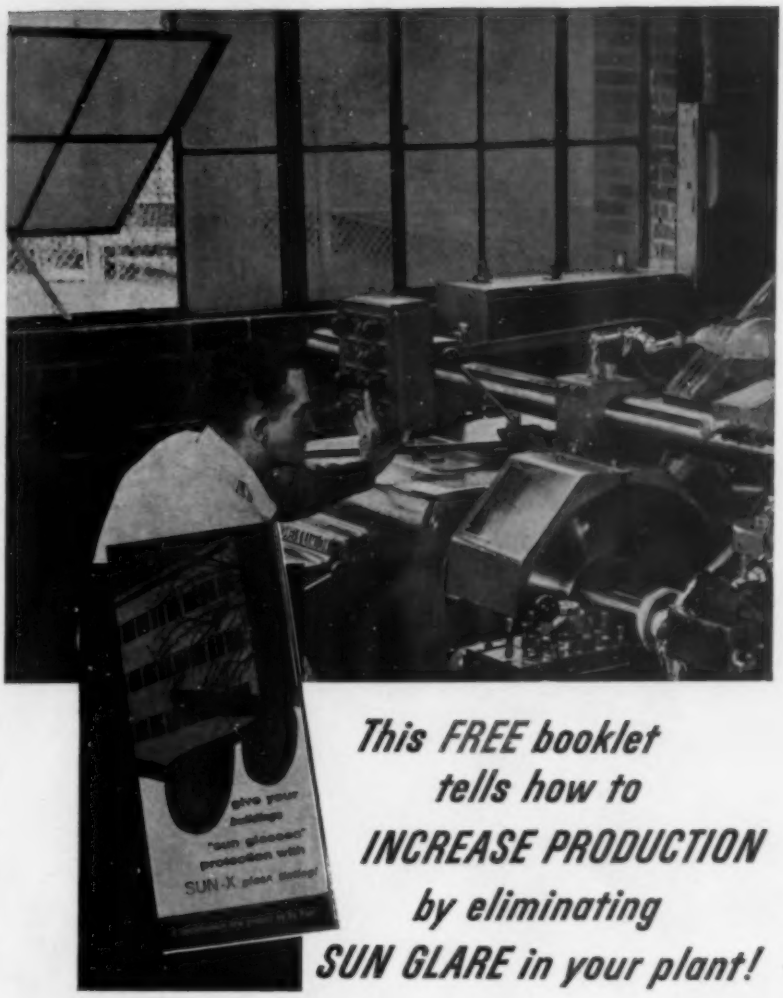
process piping where abrasive-corrosive liquids and slurries are handled. They are available with screwed ends in 2- to 4-in. sizes, with working pressure ratings of 2000 and 3000 lb, and can also be had with flanged ends. Valve wear is largely confined to the seat insert (shown at right in photo) which can be replaced with the valve body remaining in the line—the bonnet lifts off after removal of the nuts. The gate is chromium-molybdenum steel, hard-chrome plated. Maximum service temperature for the Buna N insert is 250 F. Edward Valves, Inc.

For details, circle 36 on Post Card

READ-OUT DEVICE for remotely-located liquid meters

Read-o-Matic permits plant personnel at centrally located panels to take readings of positive displacement liquid meters located as much as a half mile

away. Device is powered by a self-contained generator in the meter to which it is attached. A magnet and coils in the generator transmit an electrical pulse over low-cost, doorbell-



This FREE booklet tells how to INCREASE PRODUCTION by eliminating SUN GLARE in your plant!

Sun glare causes eye strain and fatigue . . . reduces worker output . . . increases mistakes and spoilage . . . increases accidents. And now there's a new Du Pont product that lets you eliminate sun glare in your plant—without the expense of installing factory-tinted glass in your windows!

Sun-X Glass Tinting is applied to your *existing* windows, and eliminates up to 94% of the sun's rays that cause glare . . . up to 95% of the rays that cause fade . . . up to 69% of the sun's heat rays!

Get all the facts—send for the colorful free booklet on Sun-X Glass Tinting. Find out how easily you can block out the sun's damaging rays to increase production and give a more comfortable working light in your plant! Just mail the no-obligation coupon!

SUN-X GLASS TINTING

Manufactured by Du Pont

DUPONT

INTERNATIONAL DISTRIBUTORS AMERICAN GLASS TINTING CORPORATION

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Please send free colored folder on solving sun problems

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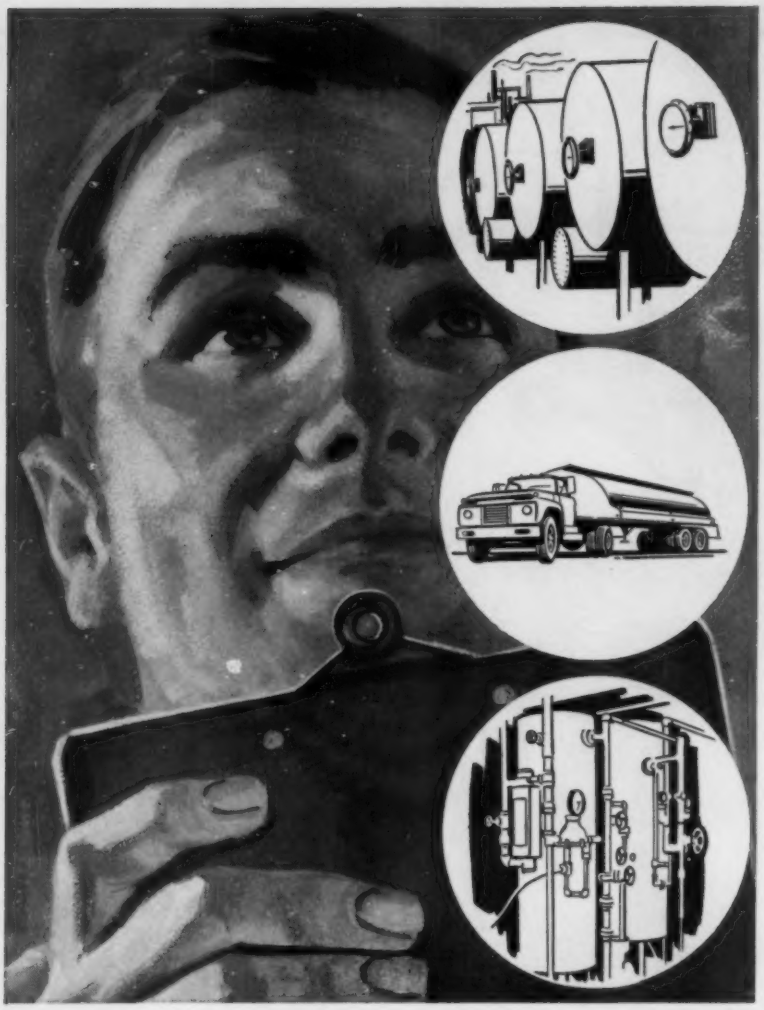
Circle 616 on postcard, page 33



TANK CONTENTS AT-A-GLANCE with Dial-Type Liquidometer Gauges

For added assurance of accurate liquid quantity record keeping, specify easy-to-read Liquidometer gauges. Positive dial-and-pointer type indicators help to prevent erroneous readings . . . speed record keeping by showing tank contents at-a-glance.

Liquidometer gauges are available to measure and indicate virtually any liquid – at the tank site or remotely. Also available: integral or separate liquid level switches for automatic level warning or control. Float, hydrostatic, electric, or electronic operation can be supplied to meet your specific needs.

Let Liquidometer's forty years of experience in liquid level gauging and control work for you. Write for latest literature.

LIQUIDOMETER INSTRUMENTS

THE LIQUIDOMETER CORP.

Dept. B., LONG ISLAND CITY 1, NEW YORK

Circle 617 on postcard, page 33

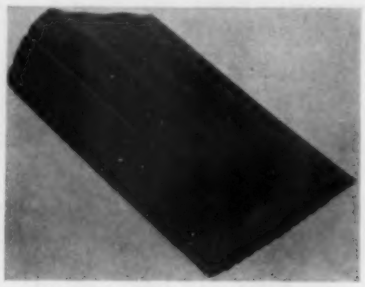
type wiring to totalizing counter on remote reading device. No outside power source is required and there are no distance limitations except that reliable transmission of pulse is limited to 10 ohm total line resistance. Badger Meter Mfg. Co.

For details, circle 37 on Post Card

More information on any of these products can be yours without cost or obligation. Use reader Service Cards provided on pages 33--34.

SAFETY WEDGE has cushion surface, non-skid thread

The Shelley Safety Wedge is designed to prevent personal injury and property damage from accidental rolling of heavy objects. Of heavy rubber, with a ribbed thread to grip the floor,



this device has a resilient top surface that cushions as it fits itself to the curve of the roll or cylinder. The wedge is 2½ in. high, has a thread length of 6½ in., and is suitable for rolls of any size—from ½-in. bars or pipes up to drums and 4-ft diam paper rolls. Standard lengths are 4, 6 and 12 in. John G. Shelley Co., Inc.

For details, circle 38 on Post Card

AIR COOLED CONDENSER offers greater Btuh output

Model HSA2-1103, of 11-ton nominal cooling capacity, is newest of company's air-cooled condensing line. Its Btuh capacity closely approaches that of water-cooled units of the same horsepower. It employs large condenser air volume and special coil circuiting to gain maximum capacity, the latter feature providing a "sub-cooling" benefit which delivers liquid re-

USE THESE IDEAS...

TO GET UP TO · AN EXTRA 4% · NET PROFIT

Out of the Texaco man's briefcase comes a wealth of ideas for cost control through organized lubrication—Texaco's "Stop Loss" Program. Managers in many industries are already using these plans to reduce losses in three important areas: production, maintenance and purchasing. Their savings go directly into profits—the average is a 4% gain in their net. Get the facts. Write for our informative folder: "How to Starve a Scrap Pile." **TEXACO** INC.,
135 East 42nd Street, New York 17, N. Y. Dept. E-190

TEXACO

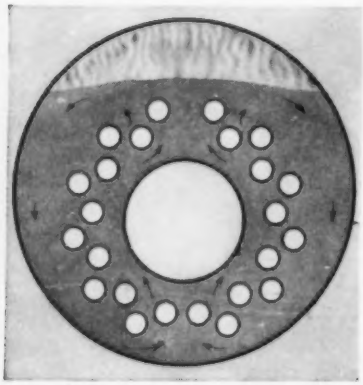
"... it is properly rated as one of the most efficient boilers on the market."

Continental

2-PASS

AUTOMATIC BOILERS

EFFICIENCY of the 2-Pass Continental Boiler means that you get guaranteed 80% minimum efficiency with oil and equivalent with gas fuel. With its simplified 2-Pass design, the Continental delivers sustained high efficiency for the life of the boiler. Stack temperature is guaranteed not to exceed 125°F above boiler water temperature.



BALANCED HEAT DISTRIBUTION. *An important reason for Continental high efficiency and long service life is equal spacing of return tubes around centrally located furnace. Large areas between tubes, furnace and boiler shell provide rapid, unimpeded water circulation, faster heating and unrestricted steam release. No Continental Boiler has ever suffered damage or failed due to "thermal shock."*

Write for latest bulletin of cost-saving features and ratings.

CONTINENTAL BOILER Division
BOILER ENGINEERING & SUPPLY CO., Inc.
Phoenixville, Pennsylvania
Nationwide Sales and Service in Principal Cities

Circle 619 on postcard, page 33

PLANT ENGINEERING EQUIPMENT

(Begins on page 182)

frigerant to the evaporator up to 20 deg cooler than evaporating temperature. The resiliently mounted compressor has lightweight aluminum pistons and rods. A full force-feed lubrication system is provided, also ambient compensated overload protection. A liquid line dryer is standard. Lennox Industries Inc.

For details, circle 39 on Post Card

FLEXIBLE GEAR COUPLING has all-nylon sleeve

Called the Mite, this flexible gear coupling has an all-nylon sleeve weighing only 2½ oz, with an outer diameter of 2⅞ in. Total coupling, including two zinc die cast hubs and two Spirolox retaining rings, weighs 14

oz. Mite operates at speeds to 500 rpm and will take up to ±3 deg misalignment. It requires no lubrication due to nylon sleeve and crown hobbed hub teeth and can run in vertical and standard position. Sizes are ⅜ in. rough bore and 0.500 to 1.125 in. finish bore. Flexible Coupling Div., Sier-Bath Gear & Pump Co., Inc.

For details, circle 40 on Post Card

VALVE eliminates condensation from compressed air

Moisture Minder is designed to automatically and continuously eliminate water and oil condensation from compressed air lines without causing pressure drop. Installation is inexpensive and fast. The valve can be attached to existing systems without cutting lines. In typical installations it is attached to filter bowls, drop legs, after coolers and compressor points. Manufacturer says it rarey needs attention and will not balance or bleed air from the system. Pressure in the system is used to remove the condensed moisture

IN PENNSYLVANIA COMPRESSORS

THE SECRET OF SUCCESS IS IN THIS "AERTYTE" VALVE DESIGN

Pennsylvania Compressors run efficiently, quietly, with minimum maintenance . . . here's why.

Pennsylvania AERTYTE Disk Valves have no nuts, bolts, or screws to break or burn fast. You get longer valve life . . . reduced wear . . . quiet operation. Flat valve discs have no flexing or bending action to weaken or distort them; they remain perfectly flat and tightly seated over long periods of service.

But this is only part of the Pennsylvania story. Learn more about the dependability of Pennsylvania compressors in our booklet, "Compressors For Industry." It describes Pennsylvania Compressors from 10 to 350 hp, horizontal, vertical, angle, and OILFRE models. Write to Dept. C-9 for your copy today.

PENNSYLVANIA PUMP AND COMPRESSOR COMPANY

Easton, Pa. · Earning Customer Confidence Since 1920

Circle 620 on postcard, page 33

ROYAL Portable Cords and Cables

Satisfy all your requirements . . . whether for extra heavy duty Type W power cable or light, flexible Type SJ cord.

Yes, one call gets them all! All types and sizes in all kinds of jackets . . . rubber, neoprene or thermoplastic. Lamp cords, fixture or machine tool wire . . . thermo or coaxial cables. All ROYAL and reliable!

Ask for them by brand name from your wholesaler . . . or write for our catalog, giving your wholesaler's name.

ROYAL ELECTRIC ...an associate of UCT

ROYAL ELECTRIC CORPORATION
PAWTUCKET, RHODE ISLAND
In Canada:
Royal Electric Company (Quebec) Ltd., Pointe Claire, Quebec

Circle 621 on postcard, page 33

PLANT ENGINEERING EQUIPMENT

(Begins on page 182)

from the air lines. In most installations no air is used. The standard 1¼-in. diam unit is under 6 in. long, threaded to fit ¼-in. pipe. Barger Mfg. Co.

For details, circle 41 on Post Card

LOAD INTERRUPTER for metalclad switchgear

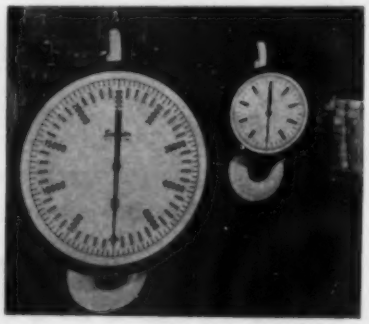
This three-pole load interrupter switches up to 1200 amp, closes on 60,000 amp when fused, and costs up to $200 less than former models that

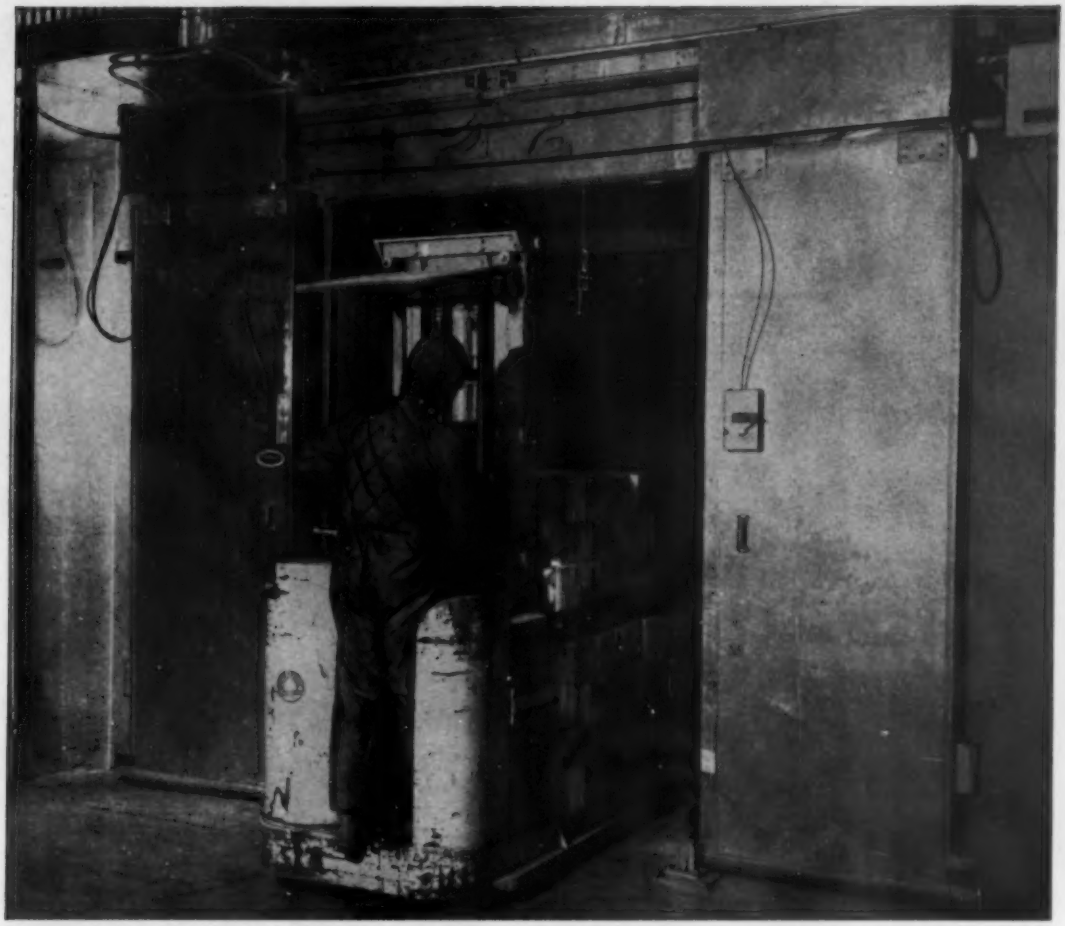
could carry 1200 amp but interrupt only 600 amp. More compact, too, this high voltage switch uses parallel pairs of blades, has dual contacts and includes integral quick-make, quick-break mechanism. Nominal voltage ratings are 4.8, 13.8 and 14.4 kv with continuous and interrupting rating of 1200 amp. S & C Electric Co.

For details, circle 42 on Post Card

CRANE SCALES feature high capacity, low headroom loss

Capacity ranges from 500 to 60,000 lb are now available in Sensater Remote Indicating Crane Scales as well as in company's standard crane scales. They feature minimum headroom loss allowing greater stacking space in storage areas. Safety features include





SMOOTHER TRAFFIC FLOW through high volume doorway with fast, automatic operation of Electroglide power door.

Jamison *ELECTROGLIDE*® Power Doors speed traffic in busy new food warehouse

SENSITIVE SAFETY EDGE. Electroglide has full travel and full height safety. Doors reverse immediately to open position when safety edge contacts person or object.

In their new warehouse at King of Prussia, Pa., Thriftway Foods installed two Jamison Electroglide power-operated doors to protect the entrances to the 8000 sq. ft. frozen food storage room. These automatic doors are handling high volume in and out traffic with these additional advantages:

rapid, convenient opening
smoother operation
maximum safety
positive sealing
low cost operation

Send for the latest Electroglide Bulletin to Jamison Cold Storage Door Co., Hagerstown, Md.

JAMISON
COLD STORAGE DOORS

Circle 622 on postcard, page 33

Dimensioned to your requirements, this new C. H. Wheeler development is the most modern pump available for the chemical, process, heating, ventilating and air-conditioning industries.

BHO End Suction Centrifugal Pumps are offered in 350 Series (stainless steel and corrosion resistant materials) for chemical and 300 Series (cast iron alloys and bronzes) for general process services.

A complete range of 14 pump sizes from 1" to 5" in both series. The size and type you need to do your job. Available for immediate shipment.

Call your C. H. Wheeler representative for full details or write for 12-page catalog and pump design manual.

C. H. WHEELER / GRISCOM-RUSSELL

Philadelphia 32, Pa. Massillon, Ohio

Affiliated sources for heat exchangers, steam condensers, pumps, marine auxiliary equipment, sea water distillation plants, nuclear steam generators and related components.

Circle 623 on postcard, page 33

PLANT ENGINEERING EQUIPMENT

(Begins on page 182)

ultimate strength of more than five times rated capacity and shatter-resistant dial crystal. Scales are calibrated in pounds or kilograms. Bulletin M-25H gives information. Martin-Decker Corp.

For details, circle 43 on Post Card

DRIP TRAPS for heating and low pressure systems

F & T Drip Traps automatically drain condensate and venting air in lines up to 2 in. Models are available with choice of five connections, ¾ to 2 in., with maximum gage pressure of 15 lb. Traps can be supplied with or without thermostatic air by-pass. Capacities range from 50 to 5750 lb of water per hour. Body and cover are semi-steel iron casting. Inlet and outlet connections have standard pipe threads. Features announced for the compact traps include stainless steel water valve and seat. Bulletin 661 gives full data. The V. D. Anderson Co.

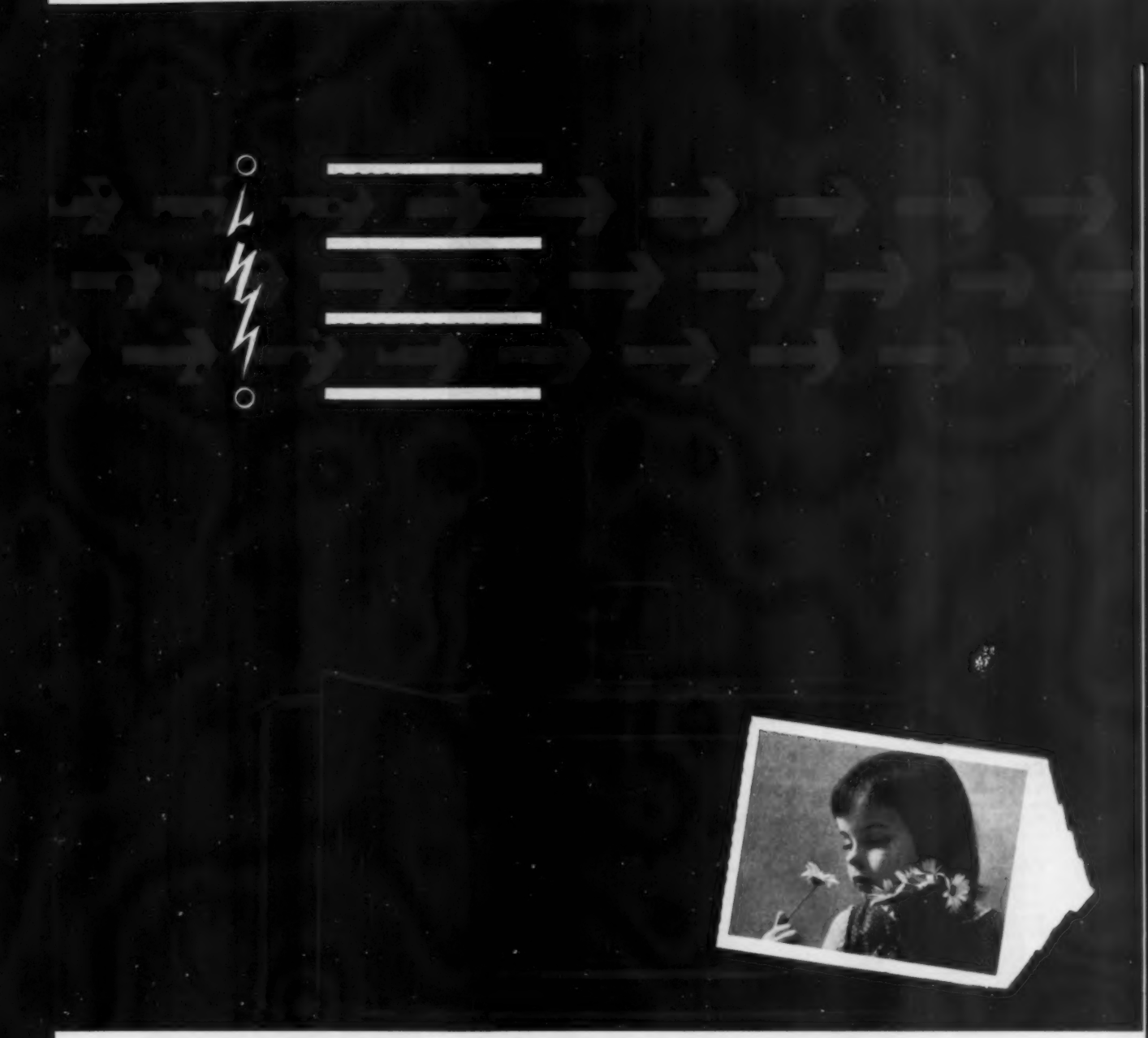
For details, circle 44 on Post Card

STEEL BUILDING made of pre-engineered sections

For easy erection and quick occupancy, the Trusspan is assembled from off-the-shelf components. Pre-engineered sections fit together to form a variety of types and sizes of buildings. They are delivered as a complete package, with siding, roofing, doors, windows

and hardware included. Featuring open web trusses, purlins and girts, this system makes possible any width in a multiple-span building with a single ridge line by using interior columns and single pitched trusses. The open-web framing offers space and support for pipes, conduit and duct work, and the bottom chord of the trusses provides a means of attaching a ceiling.

Due to substantial weight savings, special foundations aren't needed. The single ridge line eliminates need for valley gutters and interior downspouts. The low-sloped roof can be extended to



Polaroid keeps picture rolls dust-free with PRECIPITRON electronic air cleaning

The Polaroid® Land camera develops its own pictures when the user pulls the film between two rollers. This spreads developing fluid between positive and negative sheets. If dust got into the negative roll during manufacture, it could spot or streak the print at the time of developing.

Polaroid eliminates this hazard by keeping its film manufacturing plants dust-free with PRECIPITRON® electronic air cleaners. These units trap the minute particles of dirt--less than 1 micron in size --that pass right through ordinary mechanical filters. The film is protected from all sizes of airborne dirt down to 1/100 micron.

You can rid your plant of airborne contamination...reduce product rejects...cut housekeeping costs...with PRECIPITRON electronic air cleaners.

They're cheaper to own and maintain than mechanical filters, yet much more efficient. Ask your consulting engineer, or call in Sturtevant application engineers. You can be sure...if it's Westinghouse.

J-80727

WESTINGHOUSE ELECTRIC CORPORATION
Sturtevant Division, Dept. IE-27.
Hyde Park, Boston 36, Mass.

Send me your Precipitron brochure.

NAME _____

TITLE _____

COMPANY _____

ADDRESS _____

PHONE _____

®—REGISTERED TRADEMARKS

Westinghouse **Sturtevant Division**

Circle 624 on postcard, page 33

Practical Idea for the Production Man

Efficient electric hoists...to move materials overhead and release floor space for more valuable operations.

CM HOISTS

CM LODESTAR ELECTRIC CHAIN HOIST
⅛ to 2 ton capacities—First truly heavy duty version of small electric hoist. ⅛ ton model weighs only 51 lbs. Heavy duty self-adjusting brake. Upper-lower safety limit switches. CM-Alloy load chain.

CM METEOR ELECTRIC WIRE ROPE HOIST
½ to 5 ton capacities—Compact, enclosed design. Low headroom. Continuous duty motor with thermal overload protection for heavy duty service. Precision bearings and helical gears for long life. Only 110 volts at push button control.

Good Suggestion for the Maintenance Man!

Rugged lightweight hand hoists and pullers...to make your job easier and safer

CM CYCLONE HAND HOIST
⅛ to 10 ton capacities—Easy to carry and lift. One ton model weighs only 36 pounds. Made of tough aluminum alloy. CM-Alloy load chain. High efficiency. Lifetime lubrication.

CM PULLER THE "ONE MAN GANG"
¾ to 6 ton capacities—Lifts or pulls at any angle. Lever handle operation. Automatic load brake holds at any point. ¾ ton model weighs only 13 pounds. CM-Alloy flexible load chain.

ALSO... *CM Trolleys and Cranes*

Request catalog and name of local stocking distributor.

CM HOISTS

CHISHOLM-MOORE HOIST DIVISION
COLUMBUS McKINNON CHAIN CORPORATION
TONAWANDA, NEW YORK
REGIONAL OFFICES: NEW YORK, CHICAGO, CLEVELAND

In Canada: McKINNON COLUMBUS CHAIN LIMITED, ST. CATHARINES, ONTARIO

Circle 625 on postcard, page 33

PLANT ENGINEERING EQUIPMENT

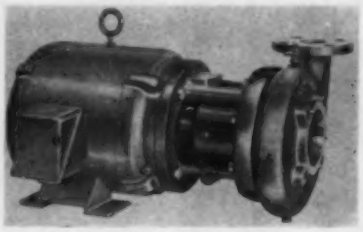
(Begins on page 182)

any practical width by combining trusses, and the low profile reduces cubage without sacrificing floor area. Heights are 12, 14 and 16 ft; widths run from 30 to 80 ft. Sidewalls can be steel, glass, brick, or stone. Republic Steel Corp.

For details, circle 45 on Post Card

SUCTION PUMP features economy and efficiency

Initial and operating costs are said to be reduced by the Type GBH Pump which provides required capacities and heads with less horsepower. Capacities range to 1600 gpm and heads to 330 ft. Maximum compactness with close-coupled end-suction design saves space, permits fast installation and



makes the unit suitable for air conditioning systems, cooling towers and other uses. Conversion for change in operating conditions is fast with interchangeable mechanical seal or packing inserts. Optional water jacketed inserts provide for hot liquids to 250 F. Balancing rings on sizes with 2-in. and larger discharge reduce thrust load on bearings. Impeller rings are optional. Aurora Pump Div., The New York Air Brake Co.

For details, circle 46 on Post Card

To receive product data circle item numbers on the handy Reader Service Cards provided on pages 33-34.

MARKING INK dries on all non-porous surfaces

Formulated for use with Weber Handprinters (devices that print from a stencil), All-Mark Ink permits a system of duplicating information on address and product identification labels and directly on non-porous surfaces formerly marked individually by hand. Numbers and other information can be printed on plastics, glass, metal, rubber, cellophane etc. at the speed of

How many of these 12 losses can you cut with Penco-Planned shelving & lockers?

☐ Product Damage	☐ Poor Inventory Control	☐ Production Bottlenecks
☐ Excessive Handling Costs	☐ Insurance Costs	☐ Shipping Bottlenecks
☐ Waste Space	☐ Pilfering	☐ Plant Cleaning Costs
☐ Slow Order-filling	☐ Accidents	☐ Low Employee Morale

If your company is considering new shelving and lockers, look into Penco Planning before you buy. Your Penco representative can show you how Penco units can be used to control *up to 12 major drains on efficiency and profitability* . . . if your operations and requirements are studied in advance. Re-check the list above! The secret is not how many units you buy, but how well units are integrated into your operations as functional systems. Check the Penco installations shown here. Then get more details in our free booklet "12 Losses Penco Planning Can Control". It's filled with slants on how to make storage facilities pay off. Finally, before you buy any lockers or shelving, call your nearby Penco dealer for advice and for fast, efficient service.

One look tells you that these Penco-Planned lockers step up employee morale, cut housekeeping costs.

New Penco T-Line boltless shelving above covers 48,000 sq. ft. . . . speeds handling of 15,000 production items. It simplifies inventory of parts in process, and permits fast changes of layout. No tools are required.

SEND FOR THIS FREE BOOKLET TODAY

ALAN WOOD STEEL COMPANY
PENCO DIVISION 430 Brower Ave., Oaks, Pennsylvania

Please send free booklet, "12 Losses Penco Planning Can Control." (No obligation, of course.)

Name_____ Title_____

Company_____

Address_____

City_____ Zone____ State_____

Please send also: ☐ General Shelving Catalog ☐ General Locker Catalog

Circle 626 on postcard, page 33

WE LIKE SPECIAL BRUSHING PROBLEMS TOO!

Though we recognize the need for brushes like this, we channel our abilities and know-how in the direction of overcoming your industrial brushing problems. It is not just one man at Newark Brush, but the entire engineering staff that goes to work. It is an organization task requiring an unusual combination of skills — plus a wide knowledge of industry's problems — that have produced for so many exactly the right brush for the job. We invite your inquiry at all times.

SINCE NEWARK 1884

Leadership Proved Through Performance! 59-55

NEWARK BRUSH COMPANY

260 MICHIGAN AVE., KENILWORTH, N. J.

Circle 627 on postcard, page 33

PLANT ENGINEERING EQUIPMENT

(Begins on page 182)

40 to 60 prints a minute. All-Mark Ink dries in seconds on many surfaces. It comes in black and five colors. Weber Marking Systems Inc.

For details, circle 47 on Post Card

PROCESS CONTROLLER is rugged, dependable

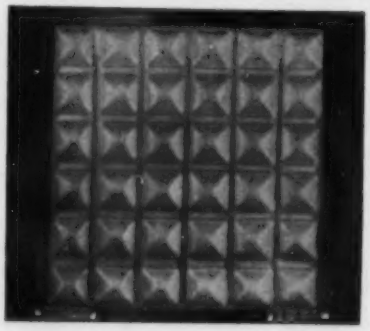
For industrial counting, measuring and control applications, this digital process controller counts pulses from all types of sensing devices to indicate and control functions of other equipment when a preset count is reached.

Its transistorized circuitry is claimed to provide millions of operations without wear. Enclosed in an attractive cabinet, it features plug-in components easily serviced from the front. Bulletin 201 gives information. The Louis Allis Co.

For details, circle 48 on Post Card

FLUORESCENT LAMP in thin, square panel style

This compact lamp fits a module 12 in. square and offers a practical way to get more light into a small place. It can be used singly or in groups, and lends itself to built-in, surface mounted, suspended and free-standing applications. Its face plate diffuses the light concealing the path of the arc. Also, the lamp's bi-pin terminals for electrical connection are behind an



Circle 628 on postcard, page 33 ➔

9:30 P.M.

Everything's under Control!

There's also an *unseen* maintenance worker on the job tonight. Robertshaw's unique Vibraswitch is monitoring malfunction on 24-hr. operating equipment...guarding costly air compressors and blower systems against the hazardous and expensive dangers of extensive breakdown. Everything's under control! Vibraswitch is the proven low-cost way to directly sense destructive vibratory forces in expensive rotating and reciprocating machinery. Instant reaction to changes in acceleration of machinery vibration with shut down, alarm and standby-actuation provisions. Should your expensive machinery break down, how costly will repairs be? Can you afford to be without low-cost Vibraswitch protection? In malfunction detection, level measurement or accurate handling of process ingredients, Robertshaw has a system for keeping "everything under control." Fifty convenient offices—write for name of the one nearest you.

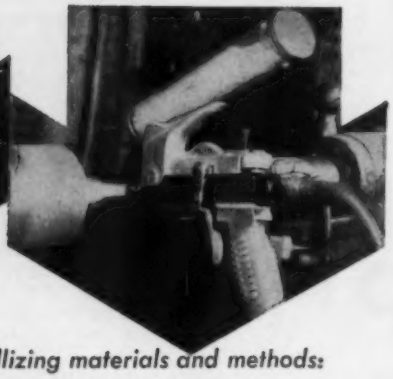
ROBERTSHAW'S VIBRASWITCH
MALFUNCTION DETECTOR
IS ON THE JOB!

Aeronautical and Instrument Division, Robertshaw-Fulton Controls Company, Santa Ana Freeway at Euclid Avenue, Anaheim, California

Robertshaw

MANUFACTURERS OF ROBERTSHAW CAPACITANCE-ACTUATED LEVEL MEASUREMENT INSTRUMENTS AND MICROSEN INDUSTRIAL PROCESS CONTROL SYSTEMS

DO YOU KNOW WHAT METALLIZING CAN DO FOR YOU TODAY?



With today's improved metallizing materials and methods:

***Plant executives* find new ways to slash maintenance costs, reduce downtime, cut machine parts inventory...**

These real-life examples show how plants save money with metallizing:

Necks of winding rolls in a textile mill were formerly repaired by a slow machining method, requiring highly skilled labor. Now the worn necks are built up with flame sprayed metal, quickly machined to size. Savings run $20,000 a year.

Valve plugs and seats, working in sand, oil and salt water, lasted only a few hours in service. Hard-faced by welding, a set cost $155, lasted from 3 to 8 hours. When flame sprayed with tungsten carbide powder, service life was increased to a minimum of *2 weeks,* 4100% longer! Cost of metallized set, $73. But reduced downtime far outweighs the dollar savings.

A Connecticut company was sending its worn shafts out for repair by welding at a cost of $50 each. Then they found a local shop that specialized in metallizing was able to do a better job for $27.50. The same job shop salvaged a big degreasing tank, value $2,850, by flame spraying with zinc for $683. The shop made money, the customer saved money.

A shipbuilding company installed metallizing equipment to repair such parts as pump rods, pistons, crank shafts for diesel engines, stern bushings, valve stems. A badly worn tugboat shaft, replacement cost $3,000, was repaired and made better than new for $400. That job alone more than paid for the METCO equipment.

From these cases you can see how modern metallizing pays, whether in plant maintenance departments or in job shops serving the many companies that don't need their own installation. Wherever there's wear, in rotary or sliding action, there's an opportunity to save money and make money.

New and improved materials

Among these new materials are a number of nickel, chrome, boron hard facing powders. Sprayed tungsten carbides are also widely used. Many others are available to give new values to the basic benefits of metallizing, which may be summarized as: less downtime; far less machining or grinding time, reduced parts inventory; and "better than new" performance of the metallized parts.

With savings like these there are big opportunities for more efficient maintenance operations, either with METCO installations or through local job shops.

To explore these advantages and see how they apply to your operation, check the coupon below and send it off today.

METCO INC.
FORMERLY METALLIZING ENGINEERING CO., INC.
Flame Spray Equipment and Supplies

1195 Prospect Avenue, Westbury, L. I.
New York Telephone: Edgewood 4-1300
Cable: METCO. In Great Britain: METCO, Ltd., Chobham-near-Woking, England

METCO INC., 1195 Prospect Avenue, Westbury, L. I., New York

How to SAVE MONEY and cut downtime with Metallizing

☐ Send copy of Bulletin 15, "How to Save Money and Cut Downtime with Metallizing"
☐ Have Field Engineer Call

Name _____

Title _____

Company _____

Address _____

City _____ Zone _____ State _____

Circle 629 on postcard, page 33

PLANT ENGINEERING EQUIPMENT

(Begins on page 182)

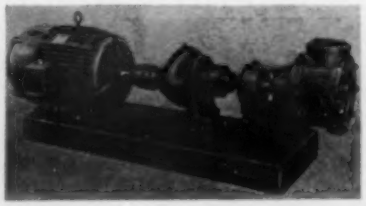
outer rim at adjacent corners and within panel dimensions.

The lamp is designed to operate at 80 w or 50 w. At 80 w it produces 4800 lumens, an efficiency of 60 lumens per watt—10 per cent more light than emitted by four conventional 20-w fluorescent lamps. First of two types to be available will emit light in equal amounts from front and back. The other will have a reflective coating on the back to direct most of the light from the front. General Electric Co.

For details, circle 49 on Post Card

LARGE ROTARY PUMPS gear reducer driven

Three heavy-duty, positive displacement, rotary pumps with nominal ratings of 200, 300 and 450 gpm, suitable for pressures to 200 psi have been



added to manufacturer's helical gear driven units. They have five gear ratios and either a 1750- or 1150-rpm motor. All are independently mounted permitting components, motor, reducer and pump, to be changed quickly. Viking Pump Co.

For details, circle 50 on Post Card

LOW COST PROCESS converts brackish water

This electrodialysis process, developed in the Netherlands and called T.N.O., is reported to convert brackish water into fresh water at a cost substantially below that of other equipment. Brackish water is fed between two ion permeable membranes and an electric current passed through the cell. One membrane is selective to positively charged ions, the other to negatively charged ions. One membrane passes negative ions, the other positive ions, with the result that water in the stream between membranes become purified.

Use of thin, rather than thick membranes, gives the T.N.O. process great flexibility, it is claimed. Another advantage is reduction in electric current required. Pressure drop in the system is about half that usually considered

FIRST PRE-PACKAGED

electric storage water heater for commercial, industrial and institutional use.

The new P-KW is the first electric storage water heater to be offered as a standard package unit. It is shipped fully wired, insulated and factory tested. It requires only electrical and water connections to place in operation.

The new unit is equipped with immersion heater, control thermostat, magnetic contactors, circuit breaker, panel control box, ASME temperature and pressure relief valves, thermometer, pressure gauge, metal jacketed insulation, and integral support skids.

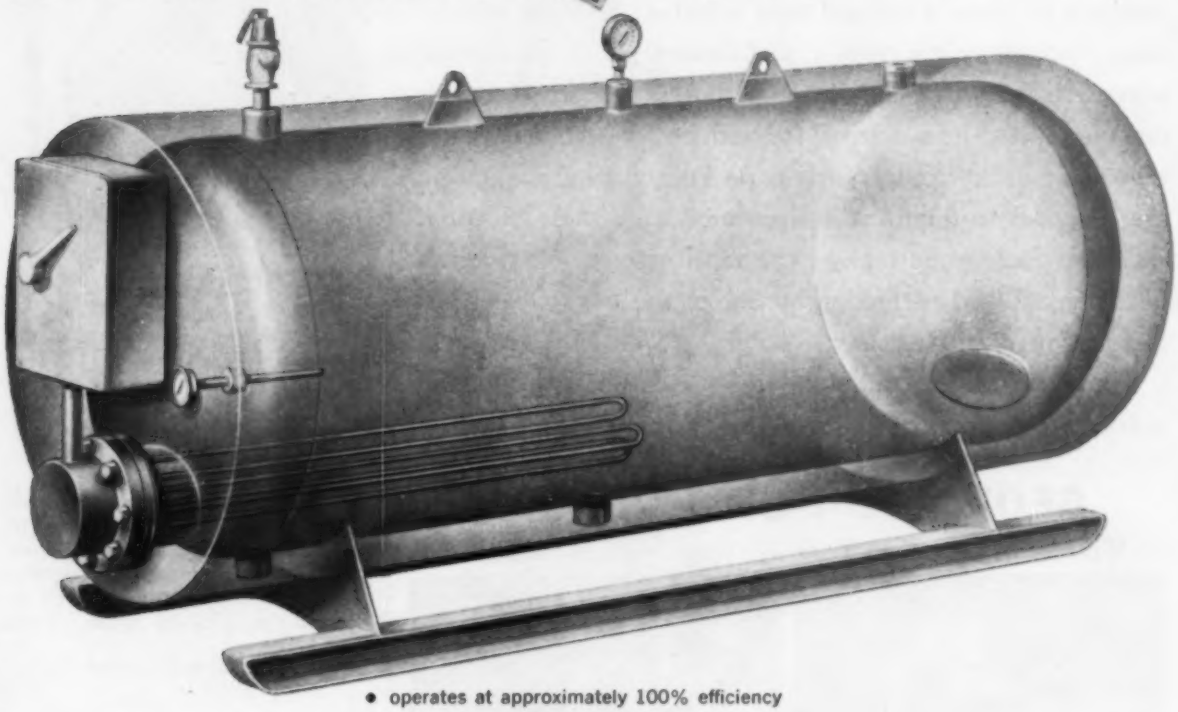
Made by P-K on a custom basis for many years, P-KW Electric Storage Water Heaters are designed and fabricated in accordance with the ASME Code and Federal, State and local regulations.

Components that comprise the electrical system, including wiring, meet the requirements of Nema standards and the National Electrical Code.

The immersion heating elements are operated approximately 10 per cent below their voltage capacity—assuring long, trouble-free service. The thermal conversion approximates 100 per cent efficiency.

Pre-packaged P-KW water heaters can be selected for three working pressures — 100, 125, and 150 psi.

WRITE FOR CATALOG NO. P-KW-1: contains diagrams, specifications, complete engineering and performance data. Address your request to: The Patterson-Kelley Co., Inc., 99 Morgan Avenue, East Stroudsburg, Pa.



- operates at approximately 100% efficiency
- storage capacities from 284 to 1,300 gallons
- recovery capacities from 41 to 410 gph
- horizontal or vertical design
- safe, silent, automatic

Patterson Kelley

Circle 630 on postcard, page 33

WHEN IT'S ON IT'S ON!

Take any Schorch Induction Motor. Switch it on. Instantly, you get full production power. Run your trouble-free Schorch for days, weeks, years . . . you'll continue to get the same reliable performance, even under difficult operating conditions. Built for the American market, Schorch motors exceed NEMA standards . . . from superior starting characteristics to top-notch performance at Class B temperatures. Humidity a problem? Schorch Drip-Proof Motors are moisture-guarded . . . sensitive operating parts treated with water and corrosion-resistant coatings. Dirt and dust a factor? Schorch Motors come completely enclosed . . . dirt cannot penetrate moving parts. And all precision Schorch motors feature compact, one-piece, cast-iron frames for reduced vibration . . . offer easy accessibility to operating parts for quick lubrication . . . are designed to minimize fatigue-producing noise. Schorch precision-quality motors are the result of over 75 years of development and perfection by one of the largest electrical factories in West Germany.

Complete range . . . all standard speeds. Large stocks and service throughout the United States. For information, write:

GEORG VON OPEL CORP.,

15 William Street, New York 5, New York • BO 9-5690

PLANT ENGINEERING EQUIPMENT

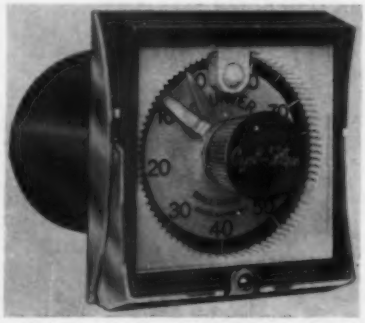
(Begins on page 182)

normal, so less electrical energy is used for pumping. It is not anticipated that electrodialysis equipment will be used for sea water at this time. It is expected to find application in areas where brackish waters are a problem, to have wide use in chemical, paper, plastics industries. Aqua-Chem, Inc.

For details, circle 51 on Post Card

PLUG-IN IMPULSE COUNTER opens or closes switch

Bulletin 725 Cycl-Flex Counter is designed to open or close a switch after a preset number of counts. It is spring reset to 0, making it applicable to automatic control circuits. The counter is furnished with its own plug-in case to be permanently mounted and wired to the application. Primarily for flush



mounting, this case is installed by cutting a 3⅛ in. opening. The mechanism may be removed and replaced in the case at any time. The unit includes two SPDT 5-amp delayed switches which trip at the end of a preset count. Another switch is operated instantly by the clutch coil at the beginning of the count. Reset time is ⅓ sec.

This counter has a maximum speed of 400 counts per minute, a range of 80 counts. It features a positive setting dial and a change of count setting may be made at any time in the cycle. It operates on 115, 60 cycles. Eagle Signal Co.

For details, circle 52 on Post Card

PIPE WRAPPING TAPES use butyl base liquid primer

Two pipe line wrapping tapes which utilize a butyl base liquid primer in application include a 15-mil laminated vinyl tape and 15- and 20-mil laminated polyethylene tape. Full coverage or wetting of pipe with the primer assures adhesion, company says, even

Why we put a nose cone on our fasteners

Four important reasons. 1) To hold the fastener in the barrel. 2) To guide the fastener and assure straight penetration. 3) To automatically clean the tool's barrel between fastenings. 4) To show visual proof of proper penetration. Without that patented "nose cone" and without our austempering process, we could never guarantee 100-for-100 fasteners and sleep nights. This way, you get the guarantee, and we get some rest. More powder actuated fastenings are made with Ramset red-tipped fasteners than all others combined. For immediate delivery call your local Ramset dealer. He's listed in the Yellow Pages under "Tools." You can count on him for on-the-site deliveries.

Ramset WINCHESTER-WESTERN DIVISION **Olin**
294-I Winchester Ave., New Haven 4, Conn.
Circle 632 on postcard, page 33

Another case history on TORIT Dust Collectors

"What have you done about this DUST?"

In our plant trouble is spelled D-U-S-T. And our plastics production V.P. wanted to know what I had done to get rid of it. He was mad, and frankly, I didn't blame him. Dust was costing us a lot of money each year—in machine wear, misalignment and down time—to say nothing about absenteeism and poor morale among the workers. How could the plant help but be dusty—with grinders, lathes, milling and molding machines running 16 hours a day.

But I explained that I had checked on several dust control systems. The problem was that in 6 months we planned to expand and re-model the shop. It seemed like throwing good money after bad to invest in a control system now. But the V.P. wanted action. He told me about a Torit engineer who had called on him claiming he had a dust control system that offered complete *flexibility.* Then he gave me his card and suggested I call him immediately.

Believe me, I called that Torit man, but fast. He explained to me the flexibility his system offered—how with just minor changes it could be adapted to the new plant layout. I bought one of his Torit Model 24 Cyclone machines for less than $1,000. It services 2 molding machines, a double-end grinder, 2 lathes and a milling machine. And it really performs—has practically eliminated the dust in our shop. We're finishing our expansion and I have ordered another Torit Dust Collector to service our additional machines. You'd hardly recognize our shop now. It's clean. Production is up—morale is up—absenteeism is lower than ever.

Cyclone Model 24

Torit can solve your dust problems. For complete facts on dust . . . and how to control it . . . write

TORIT manufacturing company

1133 Rankin St., St. Paul 16, Minn., Dept. 1832

Circle 633 on postcard, page 33

PLANT ENGINEERING EQUIPMENT

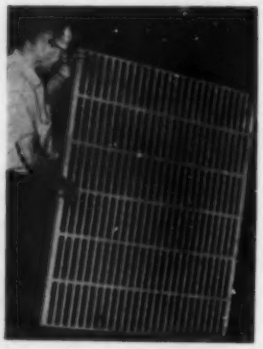
(Begins on page 182)

under conditions of dust, dew and wide temperature variations. Primer fills surface irregularities and bonds with the butyl of the tape. Plicoflex, Inc.

For details, circle 53 on Post Card

DUCTILE IRON GRATING is strong, corrosion resistant

This high strength, low-cost iron grating for driveways, loading platforms and other areas of heavy trucking or hard traffic can also be used for drain-



age and floor reinforcement. Because of the flexibility of the mold, it can be produced in a variety of designs. Manufacturer says the grating is 50 per cent lighter, has greater impact resistance, is capable of carrying a greater load than other gratings, and is superior to gray iron gratings under reasonable acid conditions. Crompton & Knowles Corp.

For details, circle 54 on Post Card

ROTAMETER TRANSMITTERS with choice of signals

These solid state electric rotameter transmitters are available with any of five d-c output signals to match requirements of most electric receivers or computers. The transmitters, which operate on an induction principle, are contained in a metal housing directly coupled to company's Safeguard or metal tube rotameters. The transmitter is therefore capable of measuring and transmitting flow rates up to 200 gpm in pipe up to 3 in., up to 600 psig. Schutte and Koerting Co.

For details, circle 55 on Post Card

AIR LINE LUBRICATOR has transparent dome

You can see the changing oil delivery rate as you manually adjust it in the Sight Feed Lubricator for compressed

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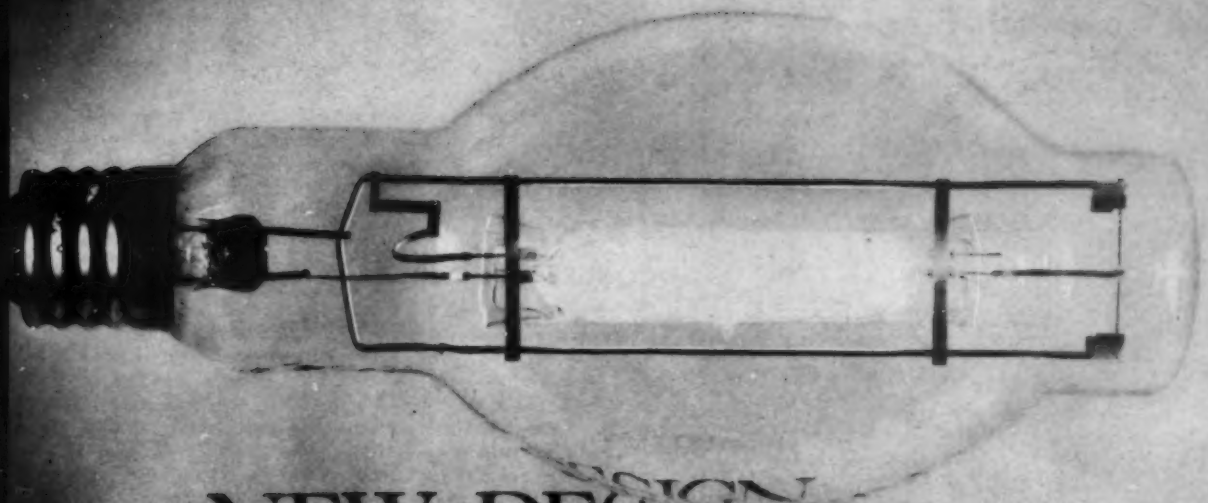
WITH WESTINGHOUSE



NEW DESIGN GIVES 25% MORE LIGHT

NEW WESTINGHOUSE "LIFEGUARD" MERCURY LAMPS...

Give you the most light per dollar . . . because a new Westinghouse electrode virtually eliminates arc-tube blackening . . . major cause of mercury lamp deterioration! As a result, new Lifeguard lamps are rated at a full 12,000 hours economical service life, and give up to 25% more light throughout their 70% longer life.

Lifeguard lamps (available in 100 to 1000 watts) are made of Weather Duty[T] hard glass for extra dependable service indoors, or out. They will not crack or craze when exposed to rain, sleet, snow, thermal shock, or corrosive industrial gases.

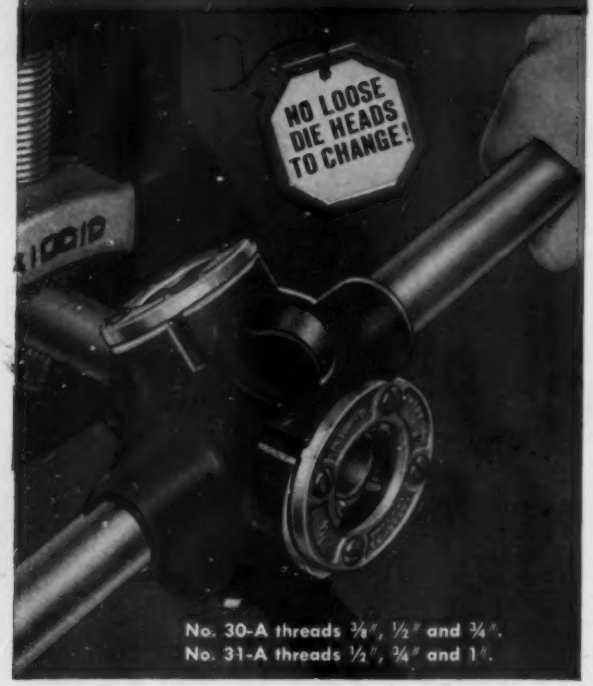
The Lifeguard lamp is just one of the many types of Westinghouse lamps designed to save you money. Take advantage of the Westinghouse Lighting Cost Reduction Plan and cut your lighting costs in one or more of the following ways: (1) Reduced cost of lamp purchases; (2) Reduced lamp replacement labor costs; (3) Increased lighting level for the same or lower power costs; (4) More efficient use of power. For complete information, call your Westinghouse Lamp Agent . . . or your nearest Westinghouse Sales Office. You can be sure . . . if it's Westinghouse.

Westinghouse

Westinghouse Lamp Division, Westinghouse Electric Corporation, Bloomfield 2, N.J.

Circle 634 on postcard, page 33

Just One
RIDGID
3-WAY
PIPE THREADER
Threads All 3
Popular Conduit Sizes!



No. 30-A threads ⅜", ½" and ¾".
No. 31-A threads ½", ¾" and 1".

Here's an extra-sturdy threader that's instantly ready to thread any of the three conduit sizes most used. Each die-set is locked in place . . . can't get lost. Yet dies are easy to reverse for close-to-wall threading. Centering guide keeps conduit straight for true-threads every time. Twin handles double leverage for easy thread cutting. Choice of long-wearing alloy or high-speed steel dies. Straight conduit dies also available.

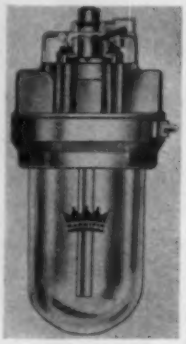
Call your distributor today. For your convenience he maintains a complete stock of RIDGID Work-Saver Pipe Tools and parts.

RIDGID
The Ridge Tool Company • Elyria, Ohio, U.S.A.

Circle 635 on postcard, page 33

PLANT ENGINEERING EQUIPMENT

(Begins on page 182)



air lines. Offered in ¼-to 1-in. pipe sizes for service to 150 psi, it provides constant oil delivery in applications that move as little as 1 to 2 cfm of air. Only a 0.4-lb pressure drop is needed to start oil feed, making more air power available for useful work. With the "sight-feed" feature, different oil rates, from virtually no-flow to steady stream, can be seen and judged as the feed is being adjusted. Bowl can be filled through large opening in top without shutting down supply of production air. Hannifin Co.

For details, circle 56 on Post Card

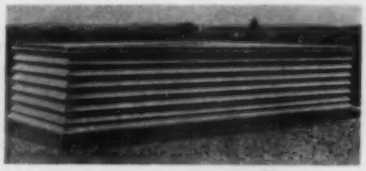
CONCRETE PRESERVATIVE is low in cost

Co-Bond is suggested for ramps, floors, walls and where concrete is subjected to heavy traffic and wear. Application is by brush, mop or spray. It penetrates deeply, lessens deterioration, moisture and salt degradation, increases concrete life and provides a non-skid surface. Available in three colors. Commercial Chemical Co., Inc.

For details, circle 57 on Post Card

ROOF VENTILATOR is light in weight

Featuring a neat, rugged, weatherproof design, the C-S Extruded Aluminum Penthouse is described as an efficient, economical, good looking pre-fabricated air intake or exhaust unit. Louver blades with mitered corners extend around four sides. Blades and sill are of aluminum sec-



tions 6063-T5 alloy, minimum 0.081 gage; fastenings are stainless steel. Roofs are designed for high winds and a minimum 30-lb snow load, and are removable for access. Aluminum construction minimizes maintenance and is lightweight. Where air control is desired, operating louvers can be supplied in place of standard fixed blades. The unit is available with screens, and in a variety of finishes, in sizes 2 ft square and larger. Dome skylight, smoke vent and operating penthouses may also be obtained. Construction Specialties, Inc.

For details, circle 58 on Post Card

SEWAGE TREATMENT PLANT is compact

This compact sewage treatment plant, available in six sizes, uses the Biofiltration process for treatment of employee and cafeteria wastes in industrial plants. The degree of treatment provided, including chlorination is said to permit safe disposal of effluent in nearby water course or body of water. Features inherent in the Biofiltration process, such as high recirculation rate and separate sludge digestion and storage, permit the plants to handle varying flows and varying strengths of sewage automatically.

Standard designs, based on 24-hr run-off, cover 10,000 to 180,000 gal per day. Initial and operating costs are low. Smaller sizes are shipped assembled. Dorr-Oliver Inc.

For details, circle 59 on Post Card

SOLIDS PUMP transfers dry materials

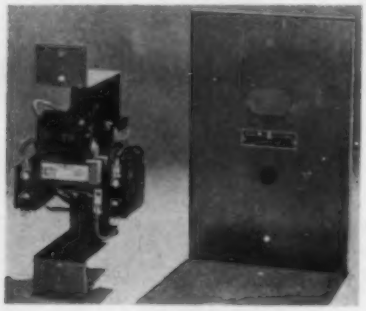
Fuller-Kompact Model 61 is a fluidized solids pump for pneumatic transfer of dry pulverized materials, such as Portland cement, limestone and clay, from storage to use

bins. Featuring compact design and flexibility, overall length is less than 7 ft, and height to top of hopper is 16 in. Pump is particularly suited for use in concrete batch plants to elevate cement from storage bins to use or batch bins above batching scales. It uses V-belt drive to match screw speed and pump capacity needs. Fuller Co.

For details, circle 60 on Post Card

MAGNETIC STARTERS for machine or wall

Flush-mounted magnetic starters, for cavity mounting in machinery or plaster walls, have been added to this company's 100 line of motor controls. The units are rated to 600 v, 60 to 25 c, in NEMA Sizes 0, 1 and 2. The starter



can be furnished in several ways, to meet mounting requirements: for machine tool applications, with a mounting bracket and front cover; for rigid conduit, in an enclosure with adjustable mounting ears outside; for plaster walls, a bracket, box and front cover for mounting prior to plastering, and a starter and cover for completion. All forms are supplied with knockouts. General Electric Co.

For details, circle 61 on Post Card

VERTICAL CONVEYOR is self-loading and unloading

The Verti-Matic permits unattended, high speed vertical movement of case goods which individually enter unit and come to rest on chain-mounted flights. The flights convey material up or down in single or multi-story operations at speed from 14 to 30 cases per minute. An infeed conveyor controls movement and automatically meters cases regardless of accumulation. Verti-Matic can be integrated in-

Work Gets Done Faster with a
RIDGID®
TRISTAND VISE
on the job!

Here's a solid workbench to speed all cutting, threading and reaming out on the job. No other vise offers as many work-saving features as this RIDGID No. 40-A Tristand Yoke Vise. • Big, rugged malleable vise base has 3 bending grooves, 6 tool slots, rear pipe rest and a ceiling brace screw for absolute rigidity if legs aren't bolted down. • Base overhangs front legs for clear tool swing. • Extra-large yoke latch opens for easy, fast insertion of long pipe lengths. • Replaceable LonGrip jaws give, slip-proof grip. • Handy tool tray locks legs open during use but folds for easy carrying with legs snap-chained together. RIDGID No. 450 Tristand Chain Vise with ⅛" to 5" capacity is also available.

EASY TO FOLD

EASY TO CARRY

Extra Rigid in Use

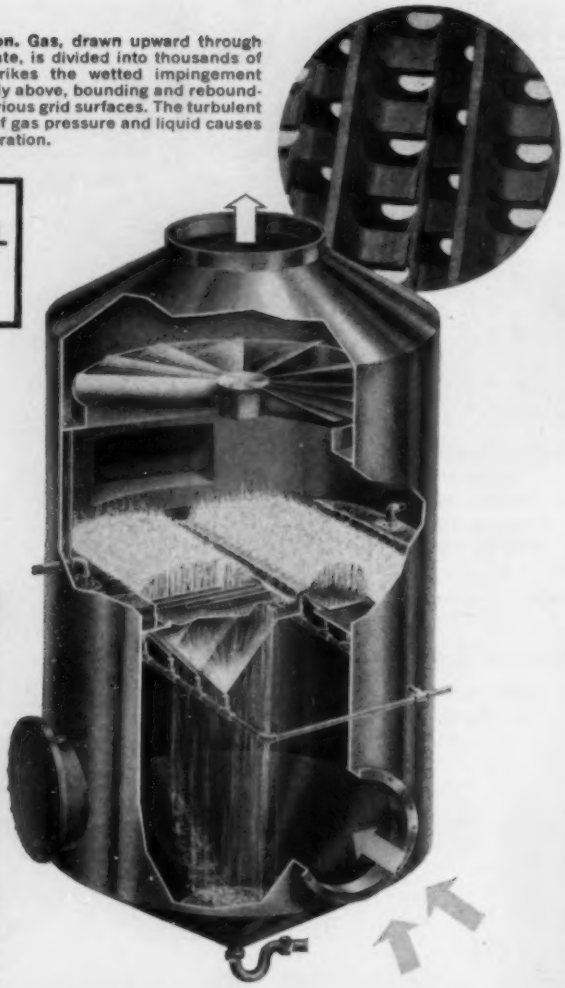
Call your Distributor today. For your convenience, he maintains a complete stock of RIDGID Work-Saver Pipe Tools and parts.

RIDGID
The Ridge Tool Company Elyria, Ohio, U.S.A.

Circle 636 on postcard, page 33

Jet-swirl action. Gas, drawn upward through perforated plate, is divided into thousands of jets. Each strikes the wetted impingement surface directly above, bounding and rebounding against various grid surfaces. The turbulent intermixture of gas pressure and liquid causes complete saturation.

See Us at the **CHEMICAL SHOW** Booth 73



NEW FROM SINCE 1874 SLY

IMPINJET™ SCRUBBER

High Efficiency... Low Operating Costs

Now Sly brings you the simplest, most effective wet cleaning method known. The new IMPINJET Gas Scrubber assures thorough saturation of particles, even in sub-micron sizes.

There are no moving parts. Complete cleaning results from the turbulent interaction of gas and liquid, as effected by the impingement baffle plate.

Pressure drop and resulting power requirements are low. Liquid consumption is only 1 to 3 gallons per 1000 CFM at 20-40 psig.

The IMPINJET Scrubber utilizes the proven principles contained in the original Harmon patents basic in the development of the impingement plate scrubber. Single-plate units effectively clean gases resulting from a wide variety of industrial processes. Multi-plate units are available for absorption, cooling and extra-high-efficiency applications.

For dust suppression, *wet or dry,* consult Sly — maker of the Dynaclone, the self-cleaning, continuously operating dry dust filter.

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Circle 637 on postcard, page 33

PLANT ENGINEERING EQUIPMENT

(Begins on page 182)

to an existing system or designed into a new one. Food Machinery and Chemical Corp.

For details, circle 62 on Post Card

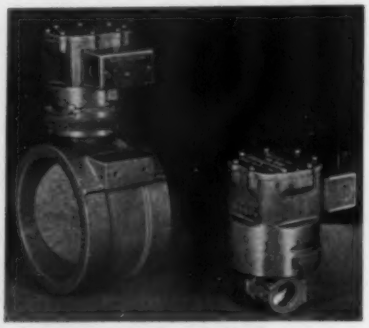
WALL CLOCK runs up to 3 yr on a single battery

Completely portable, this all chrome, battery-powered clock has a 12½-in. diam face and is reported to keep time accurately for up to 3 yr on an inexpensive battery. It costs around $25.00, including battery. You can put it up anywhere — just drive a nail and it's installed. Edmund Scientific Co.

For details, circle 63 on Post Card

BUTTERFLY VALVE has integral electric motor

This low-cost air valve eliminates external brackets and linkages by operating its valve shaft directly from a



sealed lifetime-lubricated electric power unit, giving a rugged, compact and economical motor and valve assembly. It is designed for use in low pressure process and combustion air applications to 5 psi. High and low flow positions are set by limit switches. The unit can be installed in any position, comes in up to 6-in. pipe sizes. The North American Mfg. Co.

For details, circle 64 on Post Card

COLOR CODED CONDUIT distinguishes electrical lines

Color-Coded Sherarduct Conduit, with MVC-1 coating, is rigid steel conduit, available in all sizes in five standard colors (special colors may be obtained, too) with matching elbows and couplings. The product has a baked-on, acid-resisting coating of MVC-polyvinyl to which color pigments have been added. National Electric Div., H. K. Porter Co., Inc.

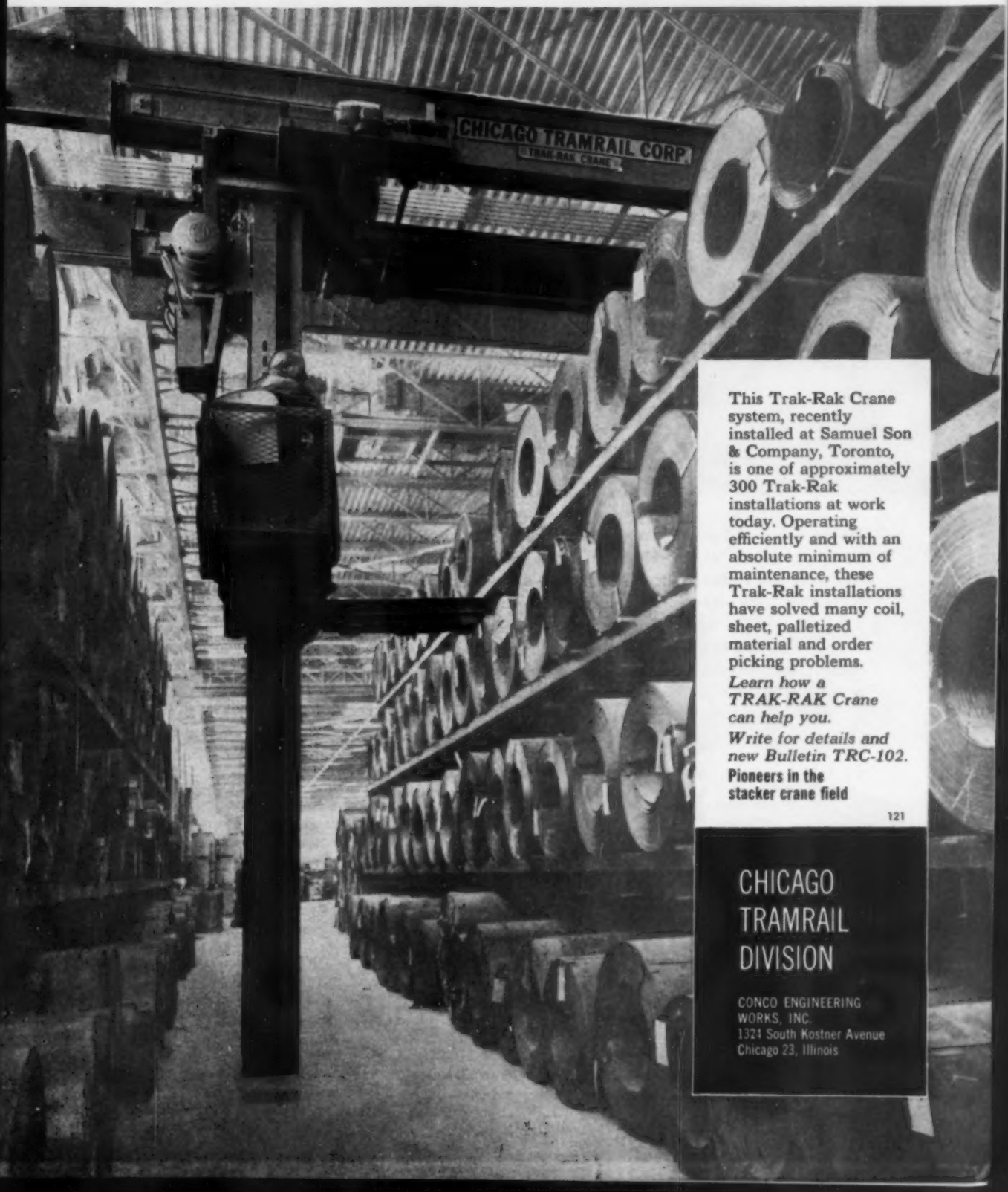
For details, circle 65 on Post Card

Circle 638 on postcard, page 33 ➔

Handling Coil with a TRAK-RAK CRANE

can bring you:

1. Up to 4 times greater storage capacity in the same area.
2. Manpower savings up to 70%.
3. 100% selectivity.
4. Increased handling speed and safety.
5. Overall reduction in warehousing costs.



This Trak-Rak Crane system, recently installed at Samuel Son & Company, Toronto, is one of approximately 300 Trak-Rak installations at work today. Operating efficiently and with an absolute minimum of maintenance, these Trak-Rak installations have solved many coil, sheet, palletized material and order picking problems.

Learn how a TRAK-RAK Crane can help you.

Write for details and new Bulletin TRC-102.

Pioneers in the stacker crane field

121

CHICAGO TRAMRAIL DIVISION

CONCO ENGINEERING WORKS, INC.
1324 South Kostner Avenue
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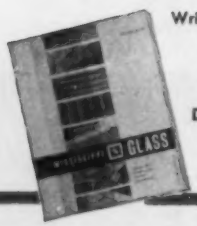
13,500 sq. ft. of ⅛" Luxlite Coolite Heat Absorbing Glass, Glare Reduced one side, has been installed in plant of Cutler Hammer, Inc., Lincoln, Ill., pioneer electrical manufacturer. Design and construction by The Austin Company.

MISSISSIPPI GLASS
tailors light
TO SUIT YOUR NEEDS

The property of light diffusion in translucent glass by Mississippi is one of the most useful tools available to engineers and architects. Rooms can be adequately daylighted far from windows; small skylights can cover large expanses of floor space with shadowless daylight; privacy can be secured . . . light controlled. Working hand-in-glove with modern daylighting practice, Mississippi glass reduces contrast that results in costly visual errors . . . keeps interiors more comfortable.

With Coolite, Heat Absorbing glass, occupants see better . . . feel better . . . work better. Coolite and a wide variety of other patterns, wired and unwired, are available at your quality glass distributor. See him today.



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Circle 639 on postcard, page 33

NEW BOOKS

for the plant engineer

Magnetic Motor Control

MAGNETIC CONTROL OF INDUSTRIAL MOTORS by G. W. Heumann. Part I: A-C Control Devices and Assemblies. Size 9¼ by 6 in.; 273 pp including index; illustrated; clothbound. Published by John Wiley & Sons, Inc., 440 Park Ave. So., New York 16, N.Y. Price $9.00.

DETAILS of a-c control devices and assemblies are discussed in this book which has a smooth style of presentation conducive to ease of picking up information. The book is slanted principally towards application aspects of electrical equipment and should make a helpful addition to a plant engineering reference collection.

The opening chapter goes into various symbols and diagrams. American Standard as well as JIC figures are presented. The following chapters deal with: a-c contactors and relays; accessories (circuit breakers, transformers, rectifiers, and switches); control-circuit devices; resistors and rheostats; solenoids, Thrustor mechanisms, and brakes; mechanical design of controllers; and maintenance.

Building Congress Proceedings

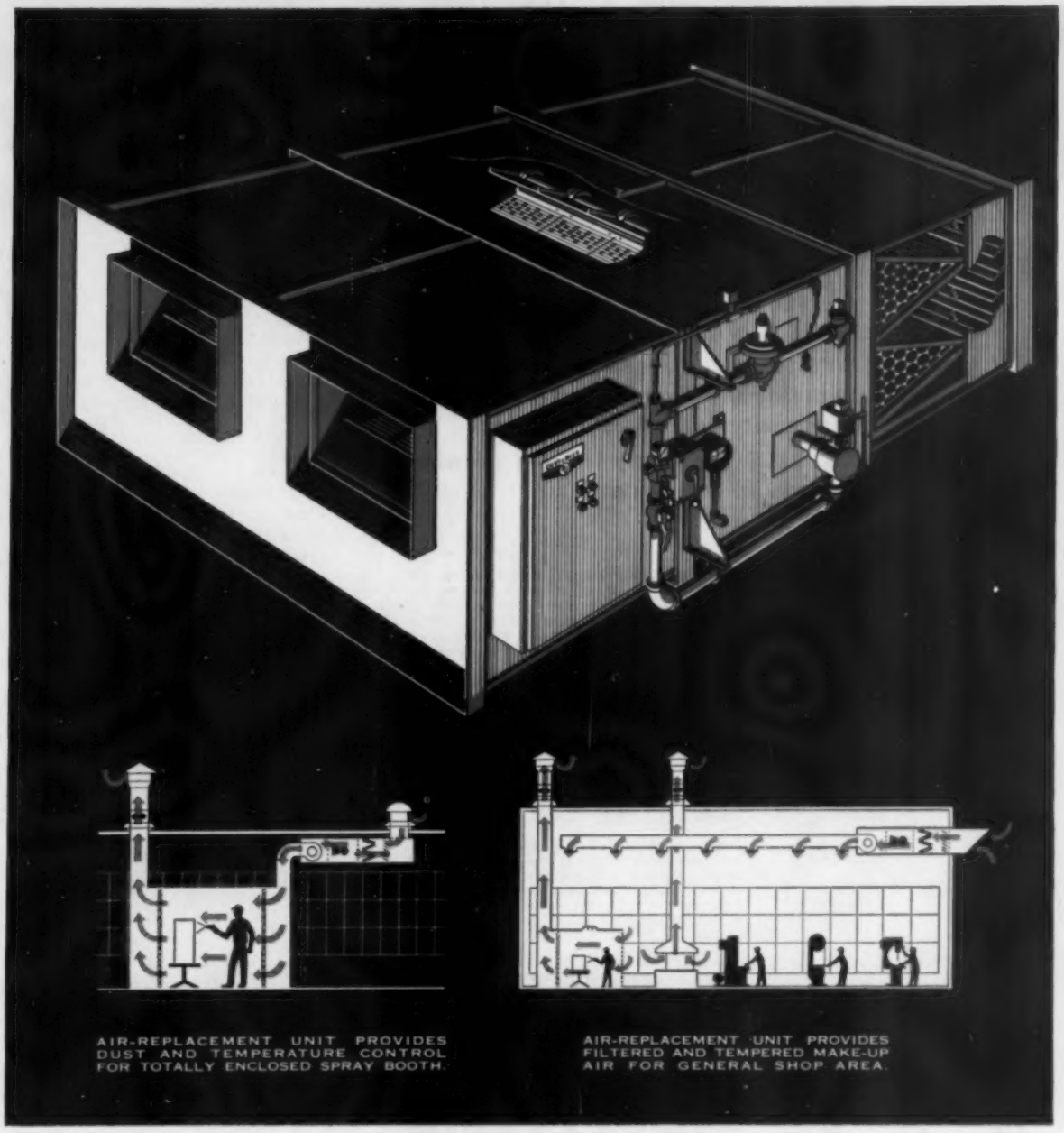
INDUSTRIAL BUILDING—Vol. I. Size 9¼ by 6⅜ in.; over 200 pp; clothbound. Published by Clapp & Poliak, Inc., 341 Madison Ave., New York 17, N.Y. Price $12.50.

THIS BOOK contains the proceedings of the Industrial Building Congress that took place last year in New York. The meeting was held concurrently with the Industrial Building Exposition.

Numerous facets relating to industrial building activities were treated in discussions at the three-day meeting. Proceedings reflect the viewpoints of industry representatives, architects, engineers, and others.

Some of the areas covered in the material presentation were: critical financial questions; employee services; use of prefabricated components; modernization vs. new plant; construction cost control; and determination of best facility for a company.

Topics of the papers presented were: Choosing the Best Method of Financing; Engineering and Construction Contracts; New Dimensions in Plant Design; New Developments in the Ap-



AIR-REPLACEMENT UNIT PROVIDES DUST AND TEMPERATURE CONTROL FOR TOTALLY ENCLOSED SPRAY BOOTH.

AIR-REPLACEMENT UNIT PROVIDES FILTERED AND TEMPERED MAKE-UP AIR FOR GENERAL SHOP AREA.

make-up air units from DeVilbiss provide effective air balance in your plant. They replace tempered air exhausted from spray booths, ovens, parts washers, dust collectors, plating and welding areas. You have better ventilation, less heat load on your central heating system. Exhaust systems work better. A package unit is your answer for volumes up to 40,000 CFM. For larger needs we can custom-design a system to meet your climate and plant conditions.

Talk to DeVilbiss about all your plant air-replacement requirements

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Circle 640 on postcard, page 33

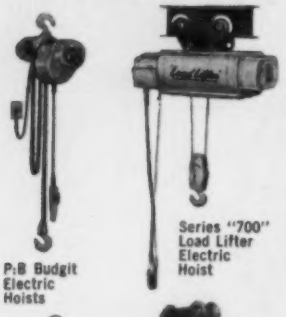
Lifting Made Easy

HOISTS AVAILABLE FOR EVERY LIFTING JOB

1✓ ELECTRIC HOISTS for frequent lifting with pace setting speed

2✓ AIR HOISTS to lift fast where atmosphere conditions are hazardous, corrosive, extremely hot, dirty or wet

3✓ CHAIN BLOCKS for easy lifting where the work cycle is moderate



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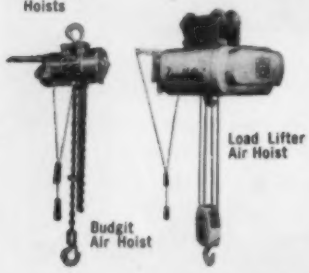
Series "700" Load Lifter Electric Hoist

ELECTRIC HOISTS

P:B Budgit® Electric Hoists. 1/8 to 2 tons. Modern push-button hoists for regular service. Portable. Two fully enclosed automatic brakes. Spotting action is fast, accurate. 1/2-ton load can be lifted at 34 FPM. Hook suspension. Trolleys available. Standard models for intermittent service — AC, DC, and 12-volt battery types — have pull cord control.

Load Lifter® Electric Hoists. 1/2 to 15 tons. For heavy-duty and production line service. Safe 24-volts at the push button. Single and 2-speed control. A ton can be lifted at 60 FPM. Two automatic brakes. Types for lug or hook suspension; also with push, hand-geared or motor-driven trolley. Hi-hook model increases length of lift.



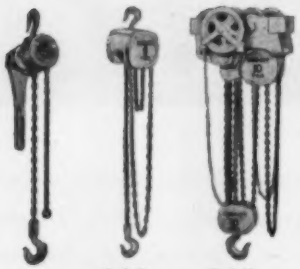
Budgit Air Hoist

Load Lifter Air Hoist

AIR HOISTS

Budgit® Air Hoists. 1/4, 1/2 and 1 ton. Compact, lightweight hoists for regular lifting service. Link and roller chain types. Explosion proof motor. Spark and corrosion resistant link chain models. Speeds infinitely variable to 75 FPM. Pull cord control. Safety hooks standard. Rigid mount type and push trolley available.

Load Lifter® Air Hoists. 1 to 15 tons. Wire rope type for heavy-duty service. Five cylinder motor for smooth operation at all speeds. Speed infinitely variable to 37 FPM. Pull cord control standard; throttle control available. Mechanical load brake adjusts itself. Lug, push trolley, and hand-geared trolley suspension.



Tugit

Budgit Aluminum Chain Block

Budgit Army Type Chain Block

CHAIN BLOCKS

Tugit® . . . the Lever-Operated Hoist. 3/4 to 3 tons. Light. Compact. Portable. Operates easily at any angle even in close quarters. Has countless uses in every industry. Spur-geared for highest efficiency. A 42-lb. pull on the handle lifts 2 tons. Spark and corrosion resistant models.

Budgit® Chain Blocks. 1/4 to 10 tons. For production or maintenance. Combine light, strong aluminum frame with spur-geared lifting and automatic load brake. 25 lb. pull on hand chain lifts 1/4 ton. Hook suspension standard. Trolleys available. Army-type Budgit has integral trolley that can be adjusted to fit several sizes of I-beams and permits high hook lift. Ask about spark and corrosion resistant models.

SOLVE YOUR LIFTING PROBLEMS. Call your nearby Shaw-Box Distributor for practical help in selecting the best type of overhead load handling equipment — hoist or crane — for each task. Or, write us for literature.

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Circle 641 on postcard, page 33

NEW BOOKS

plication of Plastics to Construction; Site Selection and Layout; Planning, Scheduling and Coordination; How and When Should Companies Handle their own Construction? and Working with Community Officials.

Industrial Furnace Guide

INDUSTRIAL FURNACES by W. Trinks and M. H. Mawhinney. Volume I; size 9¼ by 6⅛ in. approx; 473 pp; fifth edition; illustrated; clothbound. Published by John Wiley & Sons, Inc., 440 Park Ave., South, New York 16, N.Y. Price $17.00.

THE LATEST EDITION of Volume I incorporates considerable change over the previous one. The subject of industrial furnaces treated in this book pertains to types used for raising temperatures as contrasted with furnaces having such functions as melting and producing chemical changes.

In the introductory chapter various types are briefly covered and some comments on use and furnace construction elements appear. The major portion of the material in the second chapter has to do with the various ways of heat transmission to a furnace charge.

The next two chapters deal with heating capacities of batch-type and continuous furnaces. These are followed by material on fuel economy.

Other chapters deal with heat saving methods and apparatus, strength and durability, and movements of gases.

Fluid Mechanics

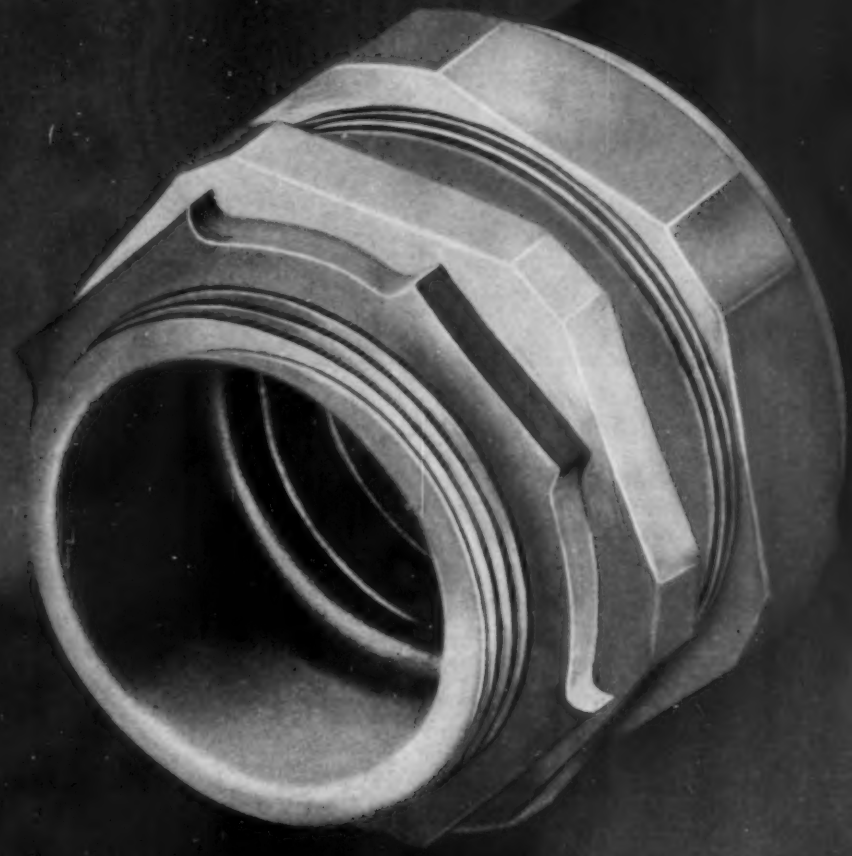
ELEMENTARY FLUID MECHANICS by J. K. Vennard. Size 9 by 7 in. approx; 563 pp; fourth edition; illustrated; paperbound. Published by John Wiley & Sons, Inc., 440 Park Ave., South, New York 16, N. Y. Price $7.95.

THIS EDITION reflects the importance of basic science in the teaching of engineering. Material in this book is slanted for beginners but prospective students should have completed courses in differential and integral calculus.

Topics of some of the chapters are as follows: fluid statics; kinematics of fluid motion, flow of a compressible ideal fluid, flow of a real fluid, liquid flow in open channels, fluid measurements, and elementary hydrodynamics.

Along with other information the appendices contain a table showing symbols and dimensions for various expressions of quantity such as mass, length, and moment; and data on physical properties of water.

ONLY GEDNEY LIQUID-TIGHT FITTINGS OFFER ALL THESE BENEFITS



MAXIMUM PULLOUT. Extensive lab testing has proved conclusively that Gedney Liquid-Tight Fittings equal or exceed the breaking point of liquid-tight conduit...connections start tight and stay tight through extra years of service life.

RE-USABILITY. Gedney Liquid-Tight Fittings can be used again and again without destroying the *brass* grounding ferrule ...the liquid-tight conduit is never damaged or made unserviceable in any way.

POSITIVE SEAL. Even the highest viscosity lubricants, oils or other liquids cannot penetrate the never-hardening vinyl sealing ring. The seal also effectively bars chemicals, fumes, dust and other foreign matter...Gedney Liquid-Tight Fittings perform better, longer, more reliably.

WIDE RANGE OF SIZES. Straight and 90° fittings from ⅜ in. through 4 in.—45° through 2 in.—combination rigid to liquid-tight from ½ in. to 1 in.

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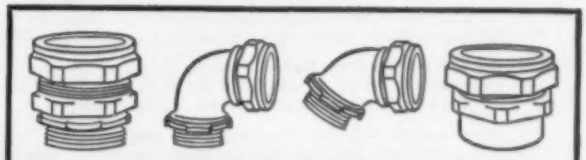

INDESTRUCTIBLE MALLEABLE IRON. Heavily plated ...the toughest metal known for fittings. Offers highest thread strength. Resists sharp blows and vibration.

When you can't take a chance on quality, specify GEDNEY Liquid-Tight Fittings. They're the finest you can buy. For descriptive literature, write or call:

GEDNEY

GEDNEY ELECTRIC COMPANY, INC.
1270 Sixth Ave., Radio City, N.Y. 20
Foundry, factory and shipping point: Terryville, Conn.

Circle 642 on postcard, page 33

...discriminating buyers choose

FEEDRAIL

Crane & Hoist Electrification Systems

1. **Electrical Safety**—Heavy gauge steel housing encloses copper bus bars, track-supported trolleys with positive polarization and uniform contact pressure, and every other provision making an electrical system safe and fool-proof is incorporated.

2. **Personnel Safety**—Metal enclosure protects plant and maintenance personnel. No dangerous bar conductors and accident-causing broken wires, trailing or strung cables.

3. **Dependability** – Rugged, precise construction, pays dividends in power continuity and maintenance—keeps cranes and hoists rolling!

4. **Adaptability**—Prefabricated runs may be of any length, straight or curved, with turntables, slide or tongue switches. Readily adaptable to suit changed conditions, every part re-usable.

5. **Compactness**—Single metal housing occupies less than half the space of open conductors or sheathed bars. Looks neat, too!

6. **Easy Maintenance**—Replacement of parts is negligible. Any part can be replaced without interfering with the rest of the installation.

7. **Life-Time Use**—Never becomes obsolete! Assures power for the life of the crane or hoist. Outlasts other types of electrification.

8. **Low Installation Cost**—Nothing left to do on the job site but to connect units together—fast—because everything has been engineered to fit installation requirements. No special tools!

Information for you: Bulletins are available on Feedrail 60 Ampere Systems (90 Ampere Intermittent Service); 100 Ampere Systems (150 Ampere Intermittent Service); and Heavy Duty Systems of 225, 375 and 500 Amperes. See your local Electrical Distributor or write Feedrail, Department P-4.

Never Becomes Obsolete

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Subsidiary of Russell & Stoll Company, Inc.

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SPECIALLY QUALIFIED REPRESENTATIVES IN PRINCIPAL CITIES

Circle 643 on postcard, page 33

BULLETINS

(Begins on page 31)

Efficient, Low Cost Filter

Eight-pp Bulletin G-331 describes single-and multiple-unit dust filters, showing design and construction details. Typical installations are pictured. The Day Co.

For a copy, circle 143 on Post Card

INSTRUMENTS, CONTROLS

Scientific and Test Instruments

Featured in 48-pp revised Catalog G-10b are instruments and systems used in scientific measurement, recording and testing, including amplifiers, components, data handling systems, lab and calibration instruments, magnetic tape instrumentation, nuclear instrumentation, oscillographs, others. Prices given. Minneapolis-Honeywell Regulator Co.

For a copy, circle 144 on Post Card

Recording, Controlling Instruments

Comprehensive selection information on recording and controlling instruments for temperature, pressure, humidity and time-of-operation is presented in 26-pp Catalog 625. Includes guide for determining thermal systems, diagrams of typical bulb installations, illustrations of basic instruments and fittings, specifications and prices. Weksler Instruments Corp.

For a copy, circle 145 on Post Card

Telemetering Explained

Bulletin GEA-7163, 8 pp, describes the use and applications of telemetering and transistorized analog systems. Includes data on adaptability, flexibility. General Electric Co.

For a copy, circle 146 on Post Card

Space-Saving Instrumentation

Small-size gages designed to match performance of larger units, yet requiring less panel space are described in 12-pp Bulletin 321.11. Lists applications for indicating draft, pressure, differential gas pressure and temperature and pneumatic impulses from transmitters. Republic Flow Meters Co.

For a copy, circle 147 on Post Card

Visual Instruments

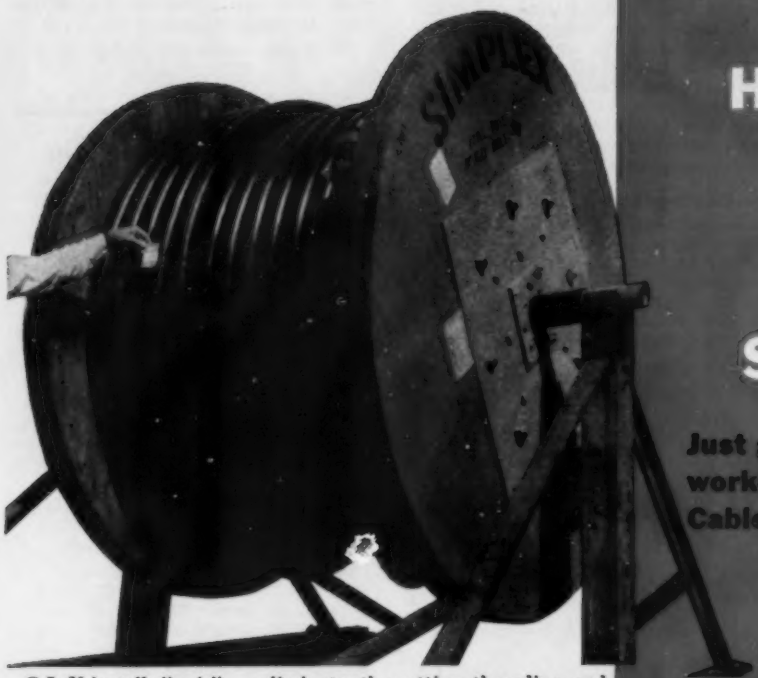
Electronic equipment showing weights on easy-to-read direct reading dials for use where printed weights are not required are in Bulletin 658-B24. Streeter-Amet Co.

For a copy, circle 148 on Post Card

Heating Furnace Controls

Virtually a treatise on automatic control for open hearth furnaces, glass tanks, reheating and annealing furnaces etc., 24-pp Folio 122 includes 50 photos and diagrams of installations, along with discussions of control sub-systems. Both hydraulic and electrohydraulic systems are covered. GPE Controls, Inc.

For a copy, circle 149 on Post Card



C-L-X installs "as is" . . . eliminates the cutting, threading, and pulling operations necessary with conventional duct or conduit.

C-L-X is pliable . . . can be handled smoothly on a standard size reel.

C-L-X is easily trained anywhere, in continuous, long-length runs.

C-L-X installs without the need for benders, sand, elbows, or similar fittings.

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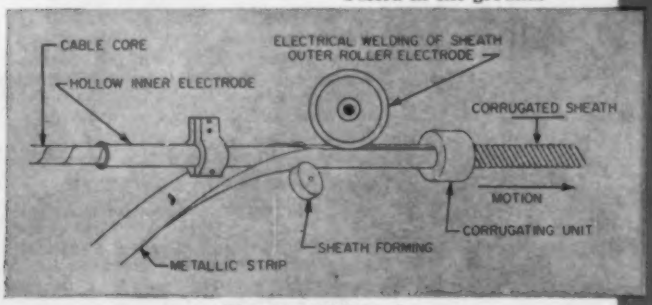


How C-L-X is made.

HOW MUCH MONEY COULD C-L-X SAVE YOU?

Just glance at these time-and-work-saving features of C-L-X Cable Systems by SIMPLEX.

You'll see how easily this packaged *combination* of cable and pliable, impervious metallic sheath installs. You'll see why it cuts installation cost to a fraction of that required for conventional cable and duct. Then *find out* how much money today's easiest-to-install cable system can save you.

C-L-X is available with plastic-jacketed sheaths of steel and with sheaths of aluminum, bronze, or copper — with or without plastic jacket. It's the choice of chemical plants, oil refineries, paper mills, utilities, industrial plants — wherever severe environmental conditions exist. Write today for your free, illustrated brochure on C-L-X.

Simplex
WIRE & CABLE CO.
Cambridge, Massachusetts • Newington, N.H.

Circle 644 on postcard, page 33

BULLETINS

(Begins on page 31)

BOILERS, HEAT EXCHANGERS

Bulk Materials Heat Exchanger

The Roto-Fin heat exchanger for high volume cooling or heating of bulk materials is described in 6-pp Folder 2911. Diagrams and photos illustrate design and operation details and typical applications. Link-Belt Co.

For a copy, circle 150 on Post Card

Two-Drum Steam Generator

Catalog SB63, 16 pp, cutaway views show step-by-step construction of the Keystone two-drum water tube package boiler for oil or gas firing, with fold out pages revealing all detail at a glance. Includes complete data for capacities to 100,000 lb steam per hour. Erie City Iron Works.

For a copy, circle 151 on Post Card

For Heating Small Plants

Technical Bulletin 549B, 8 pp, describes Square-Heat Type R series heating boilers. Includes data on ratings and dimensions of the three-pass boilers available in 12 sizes from 243,000 to 1,350,000 Btuh SBI rating. Features, specifications and selection data for heating coils and induced draft fans are covered. Industrial Div., American-Standard.

For a copy, circle 152 on Post Card

Who's Who

The first edition of "Who's Who in Certified Performance Ratings" is now available to users and specifiers of air moving equipment. This new publication of the Air Moving and Conditioning Association meets the recognized need for an official directory of manufacturers and products licensed by AMCA to use the Certified Ratings Seal.

in Certified

The 54-page directory contains essential product identification data on all air moving devices which have been tested and rated for performance in accordance with the rigid requirements of the AMCA Certified Ratings Program. Revised issues will be published periodically.

Copies of Bulletin 261A, "Who's Who in Certified Performance Ratings" are available from: Air Moving and Conditioning Association, Inc., 2159 Guardian Building, Detroit 26, Michigan.

Ratings?

Circle 645 on postcard, page 33

ELECTRICAL

Improved Low-Voltage Breakers

Features and advantages of "future planned" low-voltage power breakers are described in 16-pp Bulletin FB-1-6010. Dimensions, typical test oscillograms, rating tables and application data included. Federal Pacific Electric Co.

For a copy, circle 154 on Post Card

Magnetic Contactors, Starters

Described in 8-pp Bulletin GEA-7326 are NEMA Size 3 and 4 magnetic contactors and starters with space-saving features. Ordering details and overload relay heater selection tables included. General Electric Co.

For a copy, circle 155 on Post Card

Multi-Purpose Current Control

Form 35M, 32-pp, catalogues a line of instruments, including electrometers, micro-microammeters, microvolt-meters, regulated high voltage supply, and high megohm bridge. Applications, specifications and prices provided. Keithley Instruments, Inc.

For a copy, circle 156 on Post Card

Any of these bulletins, catalogs and technical booklets can be yours without cost or obligation. Use the Reader Service Cards on page 34.

Lead-Acid Battery Chargers

Performance features and construction details of lead-acid battery chargers are detailed in Bulletin 6202.1. Tells how to select your precision charge, includes specifications. The Lincoln Electric Co.

For a copy, circle 157 on Post Card

Foot Switch Selection

Five types, 14 forms of heavy cast iron foot switches are described in Bulletin GEA-7086A, including diagrams, selection guides, and rating charts. General Electric Co.

For a copy, circle 158 on Post Card

Silicon Rectifier Conversion Unit

Efficiency advantages of a silicon-rectifier conversion unit for electrostatic precipitators are detailed in this product bulletin. Buell Engineering Co., Inc.

For a copy, circle 159 on Post Card

How to Select Terminal, Splice

This 8-pp catalog shows how to compute exact terminal or splice barrel size required for a given size of solid, stranded, rectangular or square wire. Technique involves measurement of circular mil area of wire in cross section. AMP Inc.

For a copy, circle 160 on Post Card

Circle 646 on postcard, page 33 →

2 B&D Magnetic Drill Presses drill 1 hole every 29 seconds for 14 days!

Without letup (or breakdown), making over 42,300 holes 15/16" diameter in heavy steel plates . . . two Black & Decker Magnetic Drill Presses (¾" and 1¼" sizes) drilled around-the-clock for 14 days to meet an extraordinary deadline. The job resulted from a special rush order given Southern Reinforcing Steel Company for prestressed concrete requiring 2 large jigs. The need was for a tool with drill press accuracy, portable drill versatility and time-proved durability. That's why the choice was the Black & Decker Magnetic Drill Press.

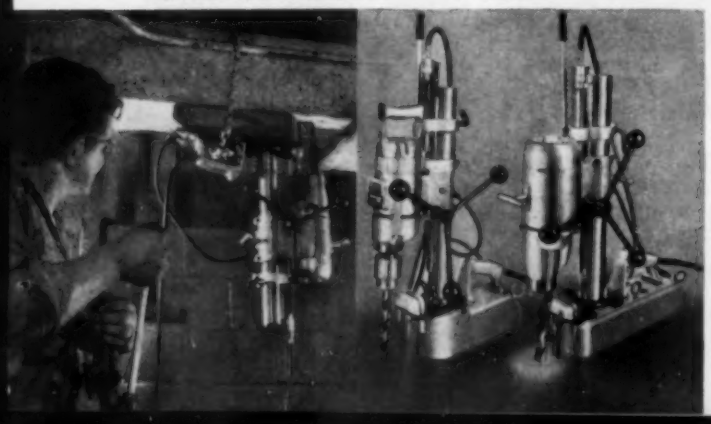
Over 1,500 pounds of magnetic power hold this drill in position . . . up, down *or* sideways. Famous B&D power makes any job quicker and easier. The Black & Decker Magnetic Drill Press is sold by leading distributors everywhere. *For sales and service, look in the Yellow Pages under* TOOLS ELECTRIC

Remote Hydra-Power Feed is available on all three B&D Magnetic Drill Presses. You just stand aside and let these tools do the work — upside down, right-side up or sideways.

Single-speed ½" and 1¼" sizes, and two-speed 1¼" model give you a three-way choice of B&D Magnetic Drill Presses. All operate manually or by remote control.

Black & Decker

CUTS MAN-HOURS TO MINUTES



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☐ Impact Wrenches ☐ Hammers ☐ Belt Sanders ☐ Drills

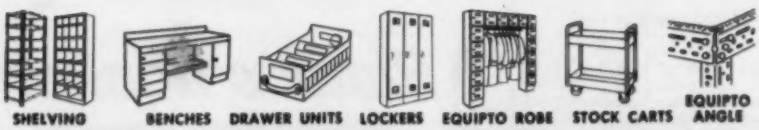
Equipto SLOTTED ANGLE

lets you build anything you can think of!

Remember all the different things you could make with an Erector set? Then think of Equipto's Slotted Angle – a man's size piece of steel utilizing nuts, bolts, slots and holes. It's a versatile piece of metal that lets you build anything – carts, benches, stairs, racks, mezzanines and many other useful time-saving structures.

The sheer simplicity of Equipto Angle makes the job of assembly highly economical in terms of manpower – just cut and bolt together. No waste – structures may be disassembled and material re-used. Not merely electro-plated, but hot dip galvanized for maximum rust prevention.

Equipto Angle is the standard of the industry. 1—Available in either 12 or 14 gauge. 2—Comes in convenient lengths packed 10 angles to a bundle with hardware. 3—Two sizes, 1½" x 2¼" and 1½" x 3". 4—Bolts are standard and interchange with other materials. Write today for your free copy of Equipto Angle Idea Book.



Equipto 744 Prairie Avenue, Aurora, Illinois

☐ Please send me a free copy of your Equipto Idea Book.
☐ Have engineer call to survey our plant for suggested uses.

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STREET_____
CITY_____ ZONE____ STATE_____

Circle 647 on postcard, page 33

BULLETINS

(Begins on page 31)

Industrial Miniature Pushbuttons

Twelve-pp Bulletin GEA-7127A contains revised information on industrial miniature oil-tight push buttons. Selection tables list forms and colors available. General Electric Co.

For a copy, circle 161 on Post Card

Electrical Tubing, Sleeving

Details on tubing and sleeving for electrical insulation in Class A through Class H temperature applications are presented in this 12-pp product bulletin. Selector charts and specifications included. Irvington Div., Minnesota Mining and Mfg. Co.

For a copy, circle 162 on Post Card

WASTE TREATMENT

Process, Waste Treating Equipment

First part of this 16-pp 1962 buyer's guide (Bulletin 1010) deals with Pfaudler process equipment fabricated from corrosion resistant materials. Second part of book presents equipment for water treatment, ion exchange, aeration, flow rate metering, demineralization and waste treatment. Each section contains engineering data. The Pfaudler Corp.

For a copy, circle 163 on Post Card

Plastic Oxidation Media

Applications of plastic biological oxidation media in aerobic waste treatment systems are described in this 28-pp technical bulletin. Physical and chemical properties, performance data and details on oxidation towers included. The Dow Chemical Co.

For a copy, circle 164 on Post Card

MECHANICAL POWER TRANSMISSION

Variable-Speed Drives

Motion-control variable-speed sheaves designed to eliminate freezing and sticking from fretting corrosion are featured in 16-pp Bulletin 25103. Includes horsepower ratings. T. B. Wood's Sons Co.

For a copy, circle 165 on Post Card

How To Select Chain Drives

Easy-to-follow chain drive selection procedures are in 12-pp Bulletin 611P, including seven selection tables arranged for quick determination of sizes, center distances, chain lengths, sprocket ranges. Rex Chain Belt Co.

For a copy, circle 166 on Post Card

On Magnetic Adjustable Speed Drives

Six-pp Bulletin 3650 describes magnetic drives from 50 through 2500 hp for application in extruders, wire drawing machinery, pumps, rolling mills. Covers basic components of the magnetic drive, theory of operation. The Louis Allis Co.

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CHECK NOW!

FOR STEAM SYSTEM EFFICIENCY

before trouble starts...

RADIATOR SUPPLY VALVE

☐ See that radiator supply valves open and close readily . . . that no evidence of leakage exists.

PROCESS STEAM TRAP

☐ Check trap interiors for proper thermostatic action . . . see that process steam pressure is adequate.

THERMOSTATIC TRAP

☐ Are trap interiors reacting properly? Be sure vacuum pump is holding sufficient vacuum.

DOUBLE SERVICE VALVE

☐ Check and replace any thermostatic element that remains permanently expanded.

FLOAT AND THERMOSTATIC DRIP TRAP

☐ Clean and repair Webster Drip Traps to assure efficiency of the distribution system.

DIRT STRAINER

☐ Be sure concentrations of dirt and sediment are removed from Webster Strainers.

There's a Webster steam specialty for every plant engineering need. The complete family of Webster steam heating products includes • Webster Thermostatic Traps for low and high pressure steam heating • Webster Radiator Valves, and Float and Thermostatic Drip Traps for a wide range of working pressures • Webster Process Steam Traps, Dirt Strainers and Lift Fittings • Check your plant needs *today*. Detailed Bulletins are available on all Webster Steam Specialty Products.

Talk to your Warren Webster Man about needed replacements. Ask him about the recommended Webster Preventive Maintenance System.

WARREN WEBSTER & COMPANY, INC.

HEATING • COOLING / CAMDEN 5, NEW JERSEY

Circle 648 on postcard, page 33

BULLETINS

(Begins on page 31)

Shear Pin Sprockets

Catalog CD-104-A describes sprockets with shear pin hubs and split taper bushings designed to prevent damage to machinery due to overloading or jamming by shearing the necked pin at a predetermined load. Browning Mfg. Co.

For a copy, circle 168 on Post Card

Improved Textile Belting

More than 50 illustrations of increased textile mill efficiency through use of company's power transmission belting are highlighted in this 12-pp booklet. Demonstrating improved belting applications from opening and picking through weaving and finishing, illustrates cost and time savings afforded. Extremultus, Inc.

For a copy, circle 169 on Post Card

Improved Air Clutch

Described in Engineering Bulletin 57A is an industrial air clutch and brake with maximum effective air pressure area, together with more compactness, greater torque capacity for its size. Specification and capacity data included. PowerFlo Industrial Clutches & Brakes.

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SIX COMMON PLANT FACILITIES...

ONE COMMON PROBLEM...

...LICKED BY E.R.P. CATHODIC PROTECTION

The problem common to all buried or submerged metals is corrosion. Electro Rust-Proofing stops corrosion . . . stops it permanently, efficiently, economically.

E.R.P. engineers survey your protection needs and design the best system for you. Then cathodic protection takes over. Your tanks and piping, piers and towers, stay like new. E.R.P. systems eliminate downtime for repairs, cut painting and labor costs. You get sure protection. Your corrosion worries disappear.

E.R.P. is a firm of specialists in corrosion prevention. E.R.P. research for over 25 years has developed new metals, new techniques, lower costs for cathodic protection. To put them to work for you, write Dept. E-57-72.

ELECTRO RUST-PROOFING CORP.
A SUBSIDIARY OF WALLACE & TIERNAN INC.
30 MAIN STREET, BELLEVILLE 9, NEW JERSEY
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Circle 649 on postcard, page 33

Dry Fluid Drives, Couplings

Bulletin 70 provides a simplified method for selecting dry fluid drives and couplings. Includes tables of weights, dimensions, prices, and recommended V-belt drives for various drive sizes. Dodge Mfg. Corp.

For a copy, circle 171 on Post Card

Flexible Coupling Selection

Design and performance advantages of flexible couplings are detailed in this 12-pp bulletin. Selection procedure is outlined, engineering data included. Lovell Mfg. Co.

For a copy, circle 172 on Post Card

LIGHTING

Why Mercury Vapor Lamps

Facts about life and maintenance, lamp construction and a chart on lumen output are in this 8-pp bulletin. Westinghouse Electric Corp.

For a copy, circle 173 on Post Card

Postage-free Reader Service Cards for your convenience in ordering these bulletins are provided on pages 33-34. You may also use the post cards for ordering literature mentioned in the ads.

Mercury, Incandescent Lamps

Illustrated and described in 16-pp Bulletin 107 are mercury and incandescent lamps for indoor and outdoor installation. Includes selection tables and candlepower curves that show light distribution patterns of various lamps described. Radiant Lamp Corp.

For a copy, circle 174 on Post Card

Emergency Lighting Systems

Detailed information on automatic emergency lighting systems and accessories is presented in 24-pp Publication 252. Describes features of nickel-cadmium battery and includes capacities and ratings, time-load requirement chart, wiring diagrams, job specifications. The Standard Electric Time Co.

For a copy, circle 175 on Post Card

LUBRICATION

Streamlining Industrial Lubrication

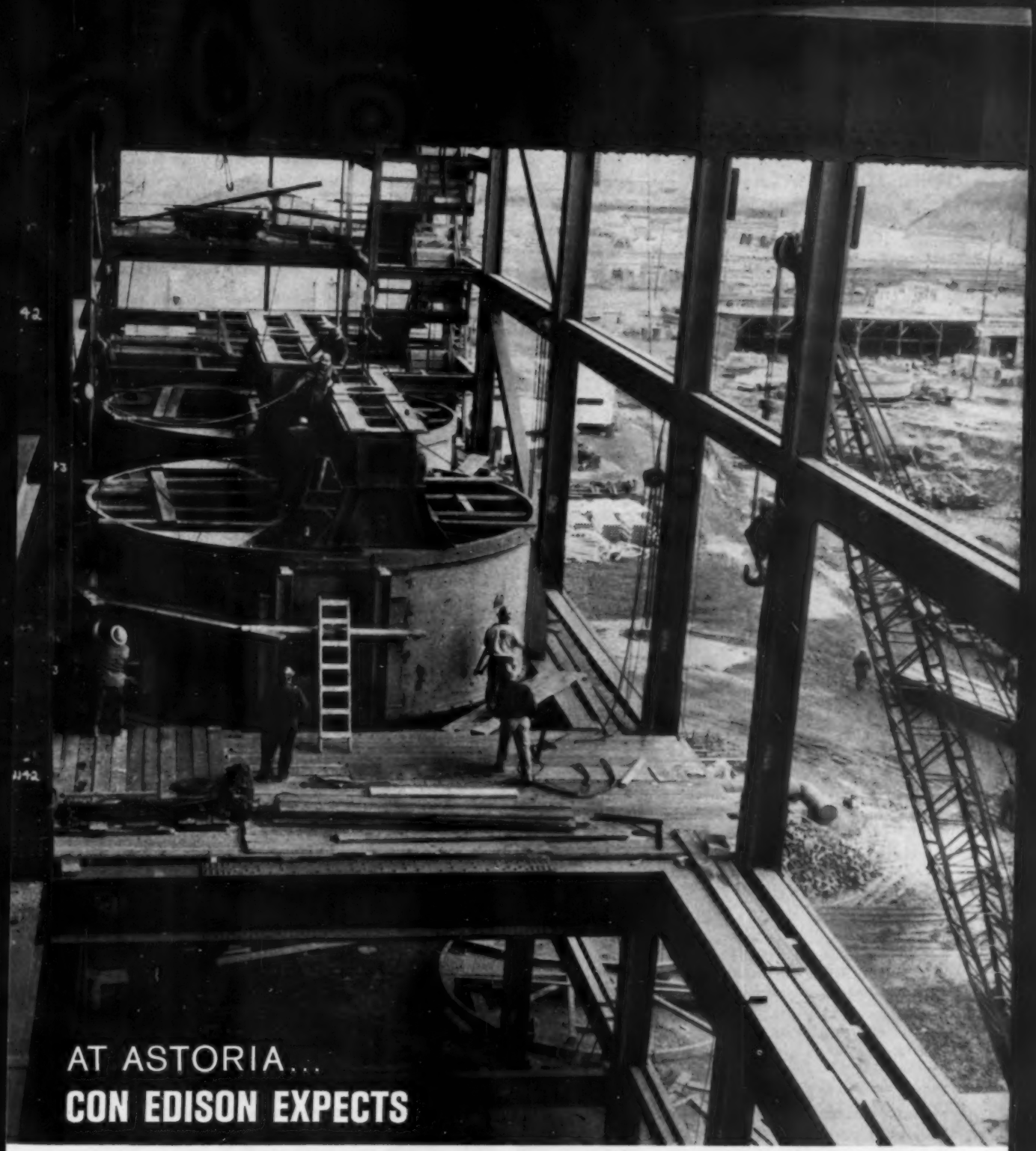
Presented in this 16-pp booklet is a six-step lubrication service. Explains how company establishes a plant's basic requirements; provides individual machine schedules; establishes inventory control plan; trains staff; sets up record system; tests oil in use. Also describes machine oils, cutting oils, cylinder and heavy mineral oils, gear lubricants, greases, others. The Pure Oil Co.

For a copy, circle 176 on Post Card

Lubrication Selection Factors

Recommendations for lubrication of various types of machinery and equipment are presented in Bulletin LMF-61. Lists lubricants from lightest fluid, to heaviest greases. Lubriplate Div., Fiske Brothers Refining Co.

For a copy, circle 177 on Post Card



AT ASTORIA...

CON EDISON EXPECTS

FUEL SAVINGS OF 8% FROM FOUR NEW LJUNGSTROMS®

Four new Ljungstrom Air Preheaters are being installed by Consolidated Edison Company of New York, Inc., on their Astoria Stations' #50 boiler unit. With a total heating surface of about 547,000 sq. ft., these four units are designed to reduce the stack temperature 345° F. By transferring this heat to the incoming combustion air, a fuel savings of about 8% is realized. Addition of these units makes a total of 16 Ljungstroms installed at Astoria . . . 77 either installed or on order in the entire Con Edison system.

Our engineers will be glad to recommend ways to improve your operating results on new or existing fuel fired units. For information, please write to:

THE AIR PREHEATER CORPORATION

60 East 42nd Street, New York 17, N.Y.

Circle 650 on postcard, page 33

BULLETINS

(Begins on page 31)

OTHER EQUIPMENT

Air and Hydraulic Cylinders

Information on selecting air and hydraulic cylinders by size, thrust, stroke, mounting, etc. is presented in 32-pp Bulletin AJH-104S. Includes torque tables, charts on column strength, rod deflections, acceleration, safety factors, other data. Miller Fluid Power Div., Flick-Reedy Corp.

For a copy, circle 178 on Post Card

On Audio-Visual Training

Publication 1455, 40 pp, tells the application of audio-visual concepts to industrial training and manufacturing. Covered in detail are concept description, production assembly, quality control, worker training and certification, work stations, and equipment specifications. Descriptions, charts are included. Applied Communication Systems.

For a copy, circle 179 on Post Card

Dry Processing Equipment

Information on crushers, grinders, pulverizers, micron-grinders, air classifiers, granulators, blenders, mixers, feeders, screens, elevators, conveyors and mechanical dens and excavators is presented in this 8-pp bulletin. Sturtevant Mill Co.

For a copy, circle 180 on Post Card

Adjustable Storage Rack

Features and applications of a bolted structural industrial storage rack made of structural steel are given in this product bulletin. Typical installations illustrated. Burtman Iron Works, Inc.

For a copy, circle 181 on Post Card

Bulk Liquid Loaders

Basic types of liquid loaders for chemical and other processing industries, principally with tank cars or tank trucks, are described in 28-pp Catalog LL, along with three types of balancing systems—compression spring, torsion spring and counter weight. Describes loading valves, joints, fittings. OPW-Jordan Corp.

For a copy, circle 182 on Post Card

Chemically Deposited Coating

Details on a method for depositing a uniform, hard, corrosion- and abrasion-resistant nickel alloy coating on iron, copper, aluminum, titanium and their alloys without use of electricity are given in 12-pp Technical Bulletin 561. Properties, advantages and applications covered. Kanigen Div., General American Transportation Corp.

For a copy, circle 183 on Post Card

Cryogenic Data Card

Reference data on this data card include physical properties of 31 cryogenic fluids, with data given in engineering and metric units. Also includes thermal characteristics of seven cryogenic insulations, table of conversion factors and special properties of hydrogen and other cryogenic fluids. Cryogenic Engineering Co.

For a copy, circle 184 on Post Card

Surface Dehumidifiers

Bulletin SCD-1, 8 pp, covers a line of sectionalized spray coil surface dehumidifiers in sizes to 50,000 cfm. Construction features are detailed, dimensions and weights tabulated. Blazer Corp.

For a copy, circle 185 on Post Card

Silicone Fluids Technical Reference

Twenty-pp Technical Data Book S-9 differentiates between available grades of silicone fluids according to viscosity and classifies them on basis of physical properties. Provides physical data summary chart and silicone fluid selector in which available grades are identified by application areas. General Electric Co.

For a copy, circle 186 on Post Card

Industrial Gas Regulator

Bulletin 406, 40 pp, covers gas precision regulators and accessories. Provides quick reference charts indicating variety and range, and a cross-referenced, illustrated layout. Air Reduction Sales Co.

For a copy, circle 187 on Post Card

Reader Service Cards for ordering bulletins are on pages 33 and 34.

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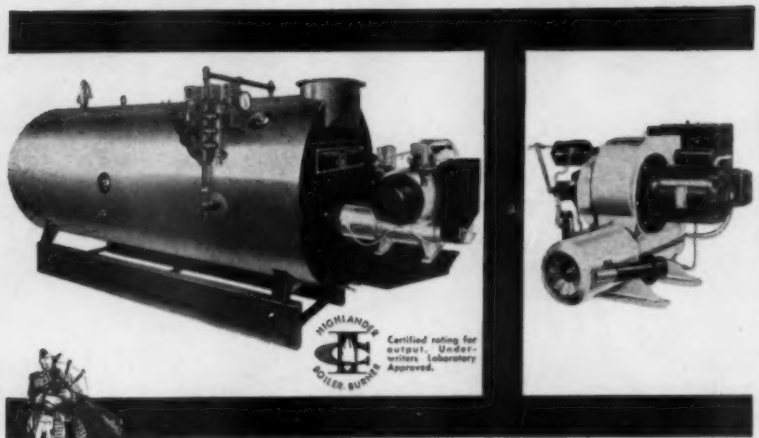
Superior Performance!



HIGHLANDER

COMPLETELY AUTOMATIC BOILER-BURNER UNIT

No boiler can operate with high efficiency without a top-quality burner to fire it. That's why the nation's foremost engineers, contractors and architects choose the reliable HEV-E-DUTY Burner for use in important industrial, commercial and institutional buildings.

Built to get maximum economy from heavy oils or low-cost gas, HEV-E-DUTY BURNERS are completely assembled, wired, tested and fired at the factory. Installation is quick and easy. You get service-free, reliable performance day after day.

PERFECTLY MATCHED FOR MAXIMUM EFFICIENCY

Designed by experienced engineers . . . the Highlander is a completely automatic boiler-burner unit, simple to install and operate. Money-saving, easy maintenance. Each unit available with oil, gas or combination gas/oil burner, is factory-tested for reliability you can depend on. The entire unit is approved by Underwriters Laboratory with certified rating output to guarantee a superior performance!

The HEV-E-OIL Burner engineered to use inexpensive No. 4, 5 and 6 heavy oils is shown here. Available from 5 to 150 gph. HEV-E-DUTY Power Gas Burners and Combination gas/oil Burners from 720,000 to 21,000,000 BTU's.

Install HEV-E-DUTY BURNERS where ever quality and dependability are essential. Replace your existing burner, or better still — install one single unit — the Highlander Boiler-Burner Unit — the ultimate in efficient operation for power, processing or heating.

For complete information, write Dept. G-91

INDUSTRIAL COMBUSTION, INC.

4447 N. Oakland Ave., Milwaukee 11, Wisconsin

Circle 651 on postcard, page 33

J F G Coffee Company, Knoxville, Tenn.

Buildings that take a daily smoke bath keep sunshine-fresh with Alcoa Alumalure finish

Despite the smoke and fumes, this building will keep its fresh, handsome look for years without costly maintenance. Yet you spend little more, right here and now, for Alcoa * Alumalure finish.

Durability? In exposure tests, this tough baked enamel has already passed the 16-yr mark with flying colors. Installation? Lightweight aluminum sheets go up fast. Even in highly industrialized atmospheres, rain mostly takes care of upkeep with Alcoa Alumalure finish.

On ribbed, corrugated or V-beam aluminum roofing and siding, you've a choice of 12 Alcoa Alumalure colors. Order from any Alcoa jobber, or through your nearby Alcoa sales office. For specification data, or brochure with color swatches, write today: Aluminum Company of America, 819-J Alcoa Building, Pittsburgh 19, Pa.

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ARCHITECTS: Painter, Weeks and McCarty, Knoxville
GENERAL CONTRACTOR: Johnson and Galyon, Knoxville
ALUMINUM SUBCONTRACTOR: Wolfe Brothers Metal and Roof Company, Inc., Knoxville

ALCOA ALUMINUM

ALUMINUM COMPANY OF AMERICA

Circle 652 on postcard, page 33

(A) High-impact hard rubber container—built to take rough electric truck use and withstand extreme temperatures.

(B) Negative plate group scientifically designed to match stepped-up capacity of Silconic "Diamond Z" positive plates.

(C) Porous rubber separators maintain their shape—channels in rib design carry electrolyte to all plate areas.

(D) Plantainer—high porosity plastic envelopes give added protection to plates yet allow free flow of electrolyte.

(E) Glass tape insulation wraps plates horizontally and vertically to retain active material and give complete insulation.

(F) Silconic "Diamond Z" positive plates accept charge easily, offer up to 25% longer life.

(G) Arched bridge allows sediment to spread across entire bottom of container—helps eliminate shorting failures.

FROM GOULD® POSITIVE POWER

Extra strength for tough jobs is yours with the positive power of Gould electric truck batteries. They're precision engineered to meet the most exacting requirements—provide sure, steady power in the hottest plant, or in the coldest yard.

A complete line is stocked nationwide for fast delivery, and Gould field engineers are located in all parts of the country to assist you in battery application and maintenance procedures. For more information, write or call your local Gould representative. Sales offices and agents in continental United States and overseas.

A complete line of charging equipment available. Ask for free catalog.

More Power to you from GOULD

GOULD-NATIONAL GN BATTERIES, INC.

INDUSTRIAL BATTERY DIVISION

GOULD-NATIONAL BATTERIES, INC.

St. Paul 1, Minnesota

Circle 653 on postcard, page 33

AVAILABLE from Advertisers

Guide to literature offered this month in ads received by PLANT ENGINEERING before the first of last month

LUBRICATION

Thermal Lubrication—Brochure answers high temperature lubrication problem. E. F. Houghton & Co.
Circle 201 on Post Card

Specialized Lubes — Information on 500 money-saving, efficient lubricants. Sinclair Refining Co.
Circle 202 on Post Card

Multi-Purpose Grease—Facts on Trojan H-2. Cities Service Oil Co.
Circle 203 on Post Card

TOOLS, MACHINE SHOP

Three-Way Threader — Facts on Ridgid pipe threader with locked-in-place die sets. The Ridge Tool Co.
Circle 204 on Post Card

Concrete Saw—Details on concrete and masonry saws and blades, core drills and bits. Clipper Mfg. Co.
Circle 205 on Post Card

Improved Vise—Facts on work-saving features of Rigid Tristand vise. The Ridge Tool Co.
Circle 206 on Post Card

Reduce Socket Breakage — Catalog tells about socket built for abuse; wrenches, tools, too. Snap-On Tools.
Circle 207 on Post Card

VALVES, PIPING, FITTINGS

PVC Ball Valves—Bulletin 196 covers their serviceability, corrosion resistance. Walworth Co.
Circle 208 on Post Card

For Corrosive Service—Circular 612 describes stainless steel ball valve. The Lunkenheimer Co.
Circle 209 on Post Card

Seatless Blow-Off Valves—Bulletin B-427 tells maintenance, performance benefits. Yarnall-Waring o.
Circle 210 on Post Card

Steam Costs High?—Facts on money-saving thermodynamic traps. Sarco Co., Inc.
Circle 211 on Post Card

Thrifty Thermostatic Trap—Details on little N-150 trap that does a big job. W. H. Nicholson & Co.
Circle 212 on Post Card

Water Delivery for Less—Booklet tells why Transite pipe does it lower cost. Johns-Manville.
Circle 213 on Post Card

Chemical - Resistant Pipe — Plastic Pipe Fact-pak gives practical product information. Carlon Products Corp.
Circle 214 on Post Card

Rubber Expansion Joints — Catalog AD-137 tells applications, advantages. Garlock Inc.
Circle 215 on Post Card

SLINGS, CHAIN, WIRE ROPE

Which Chain?—The answer is easy with Catalog 1050 listing chains and components. Link Belt Co.
Circle 216 on Post Card

Sling with Built-in Safety—Facts on Sentry Sling with warning ring for overload. Campbell Chain Co.
Circle 217 on Post Card

What Kind of Sling?—Bulletins 5308-R, 5886 give selection data on slings. Macwhyte Wire Rope Co.
Circle 218 on Post Card

MECHANICAL POWER TRANSMISSION

For Power Transmission—Bulletins cover roller bearings, conveyor pulleys, take-ups. Dodge Mfg. Corp.
Circle 219 on Post Card

High Capacity V-Belts—Information on space-saving Super HC drive. The Gates Rubber Co.
Circle 220 on Post Card

In Matched Lengths—Technical information on all types of Green Seal V-Belts. Goodyear Tire & Rubber Co.
Circle 221 on Post Card

Long Lasting V-Belts—Information on Hi-Power V-belts available from stock. The Gates Rubber Co.
Circle 222 on Post Card

Tough Bearings — Chempro Filled Teflon bearings described in Bulletin CP-558. Chemical & Power Products, Inc.
Circle 223 on Post Card

Flexible Cushion Couplings—Technical Bulletin describes long-lasting Paraflex couplings. Dodge Mfg. Corp.
Circle 224 on Post Card

Compact Coupling—Catalog lists features of Mite flexible gear coupling. Sier-Bath Gear & Pump Co., Inc.
Circle 225 on Post Card

INSTRUMENTS, CONTROLS

Measuring Instruments—Bulletin on gages for pressure, vacuum, contents. Uehling Instrument Co.
Circle 226 on Post Card

Electrical Systems—Four brochures cover emergency lighting, test equipment, time control, fire alarm systems. The Standard Electric Time Co.
Circle 227 on Post Card

MATERIALS HANDLING

For Dependable Lifting—Catalog describes chain and wire rope electric hoists. Chisholm-Moore Hoist Div.
Circle 228 on Post Card

Reliable, Low Price Hoist—Bulletin 905PE describes Type J electric hoist. Robbins & Myers, Inc.
Circle 229 on Post Card

High Capacity Hoists—Facts on W-1 electric hoists built to job requirements. Wright Hoist Div.
Circle 230 on Post Card

Lifting Made Easy—Facts on selection of overhead handling equipment. Manning, Maxwell & Moore, Inc.
Circle 231 on Post Card

Floor Savers—Handbook gives facts on easy-rolling casters, wheel. Darnell Corp., Ltd.
Circle 232 on Post Card

FANS, BLOWERS

Air Moving Equipment — Bulletin 261A tells "Who's Who in Certified Performance Ratings." Air Moving & Conditioning Association, Inc.
Circle 233 on Post Card

Rough, Tough Blowers—Details on why vaneaxial blowers stand up better. Hartzell Propeller Fan Co.
Circle 234 on Post Card

To Prevent Blower Failure—Data on versatile, rotary positive-pressure blowers. Sutorbilt Corp.
Circle 235 on Post Card

ELECTRICAL

Instant Production Power—Information on drip-proof induction motors with reliable performance. Georg Von Opel Corp.
Circle 236 on Post Card

Compact Transformer—Folder AC-100 gives features of dry type transformer. Acme Electric Corp.
Circle 237 on Post Card

Everything for Substations—Facts on complete service. Westinghouse.
Circle 238 on Post Card

Cost-Saving Bus—Details given in "Alcoa Aluminum Bus Conductor Handbook." Rome Cable Div., Alcoa.
Circle 239 on Post Card

Improved Conduit — Sample, cost data on Liquatite, flexible conduit with molded jacket. Electri-Flex Co.
Circle 240 on Post Card

Improved Control Cable—Facts on standard cable for most multi-conductor jobs. Rome Cable Div., Alcoa.
Circle 241 on Post Card

Postage-free cards for ordering literature are on pages 33-34.

Safe Starters—Facts on features of safety fusible combination starters. The Clark Controller Co.

Circle 242 on Post Card

Easy to Install, Maintain—Details on improved starters, Nema Size 3 and 4. General Electric Co.

Circle 243 on Post Card

Space-Saving Starter — Bulletin 2510BC describes many-featured manual starter. Square D Co.

Circle 244 on Post Card

Metal-Clad Switchgear—Bulletin 32-250 tells its features, advantages. Westinghouse Electric Corp.

Circle 245 on Post Card

Compact Safety Switches—Bulletin CPD-74 describes heavy- and normal-duty types. General Electric Co.

Circle 246 on Post Card

Safety Switch—Bulletin on switch with visible blade safety construction. Square D Co.

Circle 247 on Post Card

Plus Protection—Bulletins FIS, HCS tell of Fusetron dual-element and Buss Hi-Cap fuses. Bussman Mfg. Div., McGraw-Edison Co.

Circle 248 on Post Card

Work-Saving Outlets — Facts on "maintenance-man's line" of wiring devices. General Electric Co.

Circle 249 on Post Card

Storage Batteries—Simplified electricity bulletin tells how they work. Exide Industrial Marketing Div.

Circle 250 on Post Card

Battery-Charger Program — Operation 90, one-source responsibility for battery, charger, service, detailed in booklet. C & D Batteries Div.

Circle 251 on Post Card

Space-Saving Batteries — Facts on truck battery power package. Exide Industrial Marketing Div.

Circle 252 on Post Card

FILTERING

Filters for All Needs—Information on industrial filtration equipment. Commercial Filters Corp.

Circle 253 on Post Card

Solve Filtration Problems—Bulletin 300 tells advantages of Staynew Liquid Filters. Dollinger Corp.

Circle 254 on Post Card

Better Air Filtration—Details on low-cost, high efficiency Micromat media. Microtron Corp.

Circle 255 on Post Card

CONSTRUCTION

Heat Absorbing Glass—Catalog covers advantages, available types of Coolite. Mississippi Glass Co.

Circle 256 on Post Card

Glare-Free Daylighting—Details on reinforced-plastic skylights. Durez Plastics Div., Hooker Chemical Corp.

Circle 257 on Post Card

Bang-proof Door—Facts on shock-absorber door that opens easy, shuts tight. Clark Door Co., Inc.

Circle 258 on Post Card

Safety Underfoot — Bulletin AL-84 describes abrasive rolled steel floor plates. Alan Wood Steel Co.

Circle 259 on Post Card

Destruction-Resistant Floors — Brochure on Monile copolymerized floors. The Master Mechanics Co.

Circle 260 on Post Card

DUST CONTROL

Mechanical Dust Collector—Literature tells how Multiclone units trap more dust. Western Precipitation.

Circle 261 on Post Card

Operation Dust Control—Facts on how dust control equipment means money saved. Pangborn Corp.

Circle 262 on Post Card

For Cleaner Stacks—Information on custom-engineered dust control systems. Dracco Div., Fuller Co.

Circle 263 on Post Card

MAINTENANCE

Long-Lasting Paint—Facts on "Why Silicone-Based Paints Mean Less Maintenance." Dow Corning Corp.

Circle 264 on Post Card

Selecting Paint?—Slide Guide gives answers on finishes, primers, thinners. Barreled Sunlight Paint Co.

Circle 265 on Post Card

Protect with Paint—Bulletin tells of Dulux metal finishes. E. I du Pont de Nemours & Co., Inc.

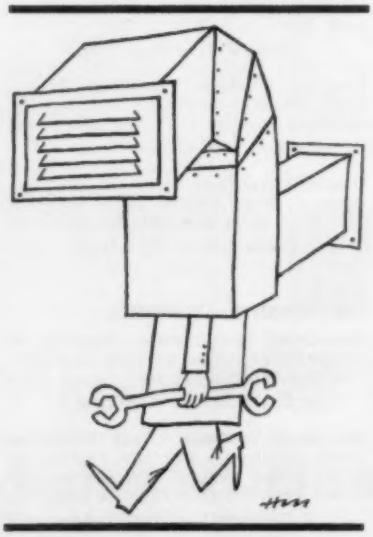
Circle 266 on Post Card

Epoxy Coatings — Literature tells how Adheron cuts maintenance cost. Hauger-Beegle Associates, Inc.

Circle 267 on Post Card

To Stop Rust—Color catalog, sample, and penetration study data of metal coating. Rust-Oleum Corp.

Circle 268 on Post Card



Safety at All Levels — Details on Bally-Hi two-stage, wheeled-frame ladder. Ballymore Co.

Circle 269 on Post Card

STORAGE

Planned Shelving, Lockers—Facts on "12 Losses Penco Planning Can Control". Alan Wood Steel Co.

Circle 270 on Post Card

Easy-to-Assemble Structures — Equipto Angle Idea Book gives helpful suggestions. Equipto.

Circle 271 on Post Card

Metal Framing System—Booklet describes galvanized channel framing. The Globe Co.

Circle 272 on Post Card

Steel Equipment — Catalog covers hundreds of items—shelving, cabinets etc. Lyon Metal Products, Inc.

Circle 273 on Post Card

PUMPS, COMPRESSORS

Pump Selector—Describes complete line of pumps. Nagle Pumps, Inc.

Circle 274 on Post Card

Heavy-Duty Pumps — Catalog SP-534Z gives details on helical gear-driven pumps. Viking Pump Co.

Circle 275 on Post Card

Economical Pumps—Brochures give details on pumps—vertical turbine, centrifugal, sump, internal gear rotary, submersible. The Deming Co.

Circle 276 on Post Card

Pumping Problems?—Bulletin 100-PE tells how Moyno pumps solve them. Robbins & Meyers, Inc.

Circle 277 on Post Card

Corrosion Resistant Pumps—Circular 217 covers Type pH pumps. Dean Brothers Pumps Inc.

Circle 278 on Post Card

For High-Force Needs—Data on two-speed hydraulic pump. Owatonna Tool Co.

Circle 279 on Post Card

Leakproof Pumps—Bulletin 977 describes Can-O-Matic pump with self-adjust bearings. Buffalo Forge Co.

Circle 280 on Post Card

Low-Maintenance Compressor—Bulletin C-5A describes efficient rotary units. Fuller Co.

Circle 281 on Post Card

Oil-Free Compressors — Bulletin CRC-10 tells about compressor that delivers pure, clean air. Gardner-Denver Co.

Circle 282 on Post Card

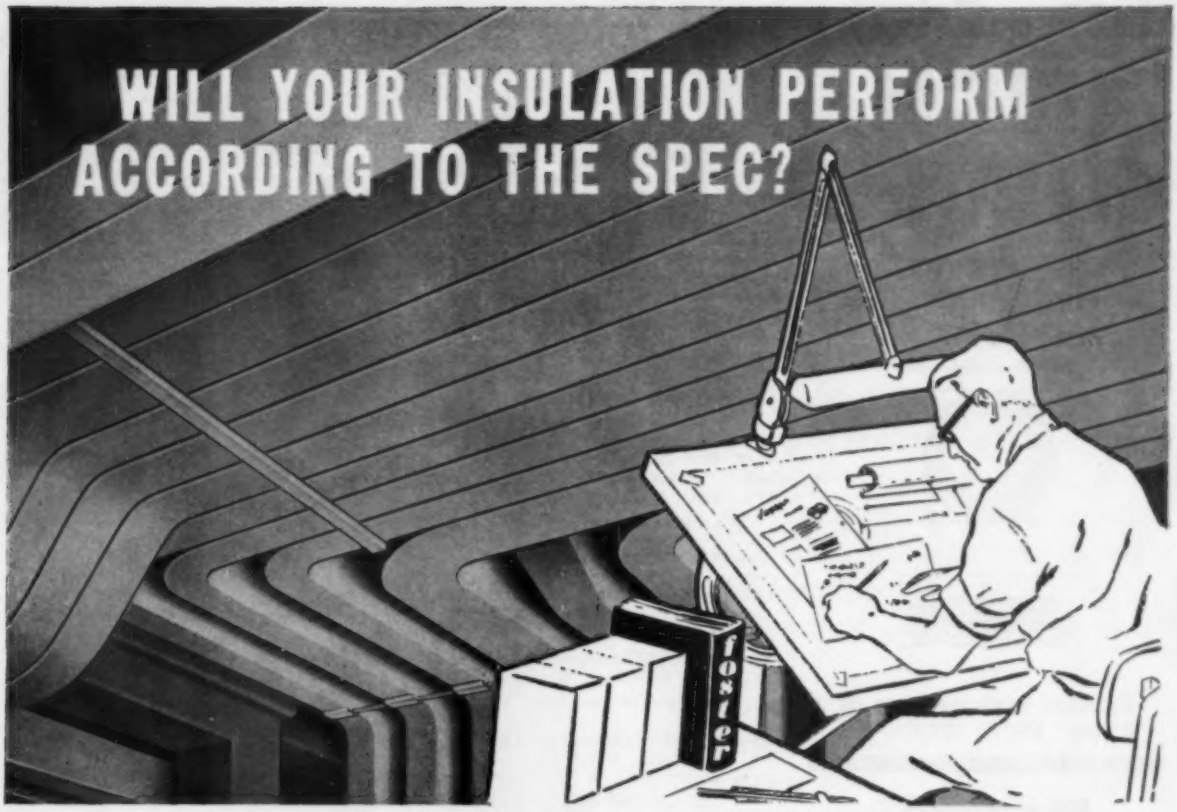
PLANT SECURITY

No Upkeep—Catalog describes all-aluminum fence. Anchor Fence.

Circle 283 on Post Card

Chain Link Fencing—Booklet describes style, gates, components. Page Fence Association.

Circle 284 on Post Card



there's a foster protective system to help make sure it will

When the thermal-insulation specification includes the name "Foster," you're assured a protection system engineered to resist practically every condition the insulation can be expected to encounter. And only with the proper protection will the insulation perform efficiently.

There's no such thing as "or equal" when it comes to protecting your costly investment in insulation. Only the Foster system in the specifications can be relied on 100% to fill the bill.

Foster insulation-protection research has developed adhesive, vapor-barrier, and coating systems to meet virtually every conceivable thermal-insulation requirement. A letter or call outlining your problem will bring one or more Foster Bulletins which should contain an appropriate solution.

Thermal Insulation Protected By foster Fire Resistive Specifications

A symbol of fire resistive construction

ARE YOUR SEALED DUCTS FIRE-SAFE?

SPECIFY *foster* 30-02

FIRE-RESISTIVE HIGH-VELOCITY DUCT SEALER

COATINGS, SEALERS, ADHESIVES FOR THERMAL INSULATION

BENJAMIN *foster* COMPANY

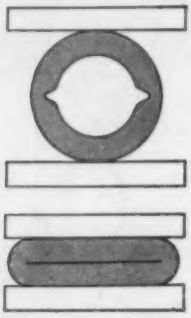
Division of Amchem Products, Inc

4635 WEST GIRARD AVE.—PHILADELPHIA 31, PA.

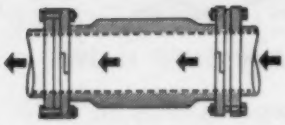
Circle 654 on postcard, page 33

Massco-Grigsby PINCH VALVES

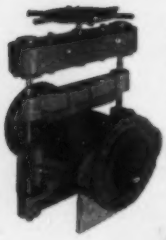
"Hinged" sleeve permits tight closing reduces wear.



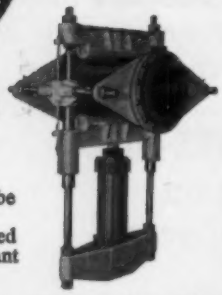
Recesses in sleeve serve as "hinges" during compression.



Unobstructed flow eliminates high friction loss; and there are no metal parts in contact with pulp or liquid.



Several types of closing mechanisms are available, from handwheel to motorized.



Automated Systems. Completely automatic systems may be coordinated and interlocked with other plant equipment.

1" to 14" I.D.; pressures to 150 psi; temperatures to 200° F.

WRITE FOR CATALOG 609

MINE AND SMELTER SUPPLY CO.

3800 RACE STREET • DENVER, COLORADO
OFFICES AND AGENTS IN PRINCIPAL CITIES

Circle 655 on postcard, page 33

Plant Protection — Catalog covers chain link fencing. Anchor Fence.
Circle 285 on Post Card

OTHER EQUIPMENT

After Coolers—Bulletin 130 covers thrifty Aero units for compressed air, gases. Niagara Blower Co.
Circle 286 on Post Card

Air-Draulic Devices — Catalog on equipment with controlled accuracy. Logansport Machine Co., Inc.
Circle 287 on Post Card

No Smoke, No Odor—Facts on completely-consumed waste disposal. Joseph Goder Gas Incinerators.
Circle 288 on Post Card

Pick the Right Signal—Bulletin K helps evaluate equipment. Benjamin Div., Thomas Industries, Inc.
Circle 289 on Post Card

Automatic Boiler-Burner — Data on economical Hev-E-Duty units. Industrial Combustion, Inc.
Circle 290 on Post Card

Fuel Oil Additive—Details on how to put power into fuel. Kor Corp.
Circle 291 on Post Card

Engineered Equipment—Catalog A-661 presents finishing, processing equipment. The R. C. Mahon Co.
Circle 292 on Post Card

Heavy-Duty Mixer—Catalog 8A describes double-barrel paddle mixer. The J. B. Ehrsam & Sons Mfg. Co.
Circle 293 on Post Card

Fire-Resistant Fluid—Data on Pyrogard C hydraulic oil. Mobil Oil Co.
Circle 294 on Post Card

Anti-Friction Packings—Catalog Ad-186 describes leather packings impregnated with molybdenum disulfide. Garlock, Inc.
Circle 295 on Post Card

Make-up Air Systems—What to consider in designing them is presented in booklet. Reznor Mfg. Co.
Circle 296 on Post Card

Danger Warnings — Catalog shows electrical, other accident-prevention signs. Stonehouse Signs.
Circle 297 on Post Card

For Pure Compressed Air—Catalog 1043 gives features of Chem-Guard dehydrator Wilkerson Corp.
Circle 298 on Post Card

Disposable Wipers—Details on Kimtowel's cost-cutting plan. Kimberly-Clark.
Circle 299 on Post Card

For Better Welds—Facts on Norpak transistorized welder control. Square D Co.
Circle 491 on Post Card

Insulation for Tanks, Towers—Application data on Ultralite glass fiber blankets. Gustin-Bacon Mfg. Co.
Circle 492 on Post Card

WHERE FAILURE COULD BE COSTLY ...SPECIFY SUTORBILT BLOWERS

In chemical plants and other critical installations, you can count on Sutorbilt rotary positive-pressure blowers for double dependability:

- Simple, rugged precision construction means long, reliable service. Rotors, gears and bearings are the only moving parts.
- Long-lasting, lip type seals, and non-lubricated compression chamber prevents air contamination.

There is positive, constant pressure. The two counter-rotating figure-eight Sutorbilt impellers produce a metered air supply.

Sutorbilt blowers and pumps deliver air and gas in capacities up to 23,000 cfm at pressures up to 12 pounds.

Write for detailed specifications on the versatile Sutorbilt Blowers, Dept. D.

Sales representatives in principal cities

4472
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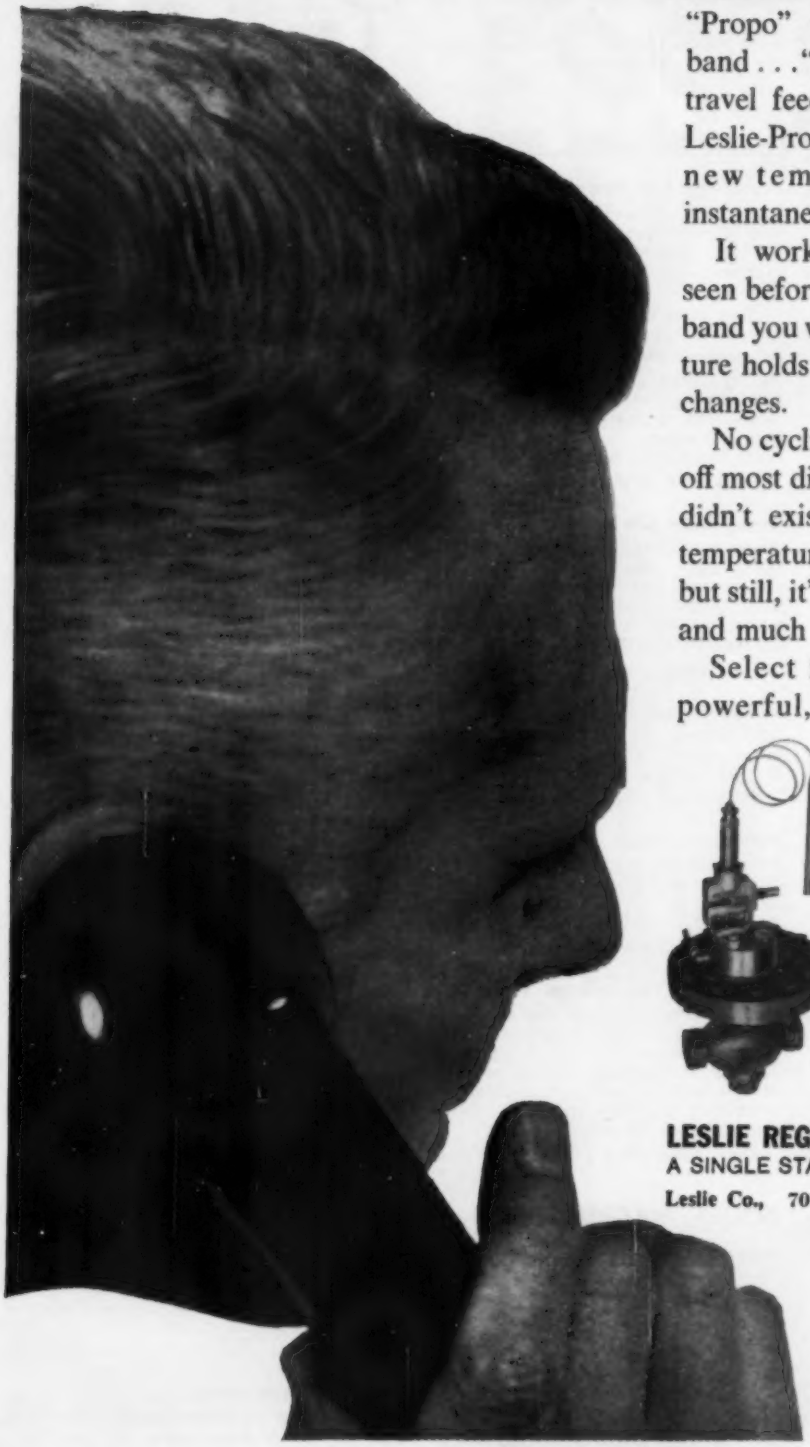
SUTORBILT IS WELL BUILT **CORPORATION**

2966 EAST VICTORIA ST. • DOMPTON, CALIF.
Subsidiary of Fuller Company • Catasauqua, Pa.

Circle 656 on postcard, page 33

The best name we can think of is

PROPOMATIC



"Propo" for adjustable proportional band . . . "Matic" for automatic valve travel feedback. Put them together — Leslie-PropoMatic® — and you get the new temperature regulator for instantaneous-type heater service.

It works like nothing you've ever seen before. Set the dial for the control band you want, and that's all. Temperature holds steady, even under fast load changes.

No cycling. It's stable! And it shrugs off most dirty steam problems as if they didn't exist. In *effect* it's a pressure-temperature cascaded *control system* — but still, it's a *regulator* — easy to install, and much less in initial cost!

Select from 50F, 100F or 200F powerful, interchangeable thermo elements. Bronze or iron, ½ to 4", screwed or flanged ends. PropoMatics handle inlet pressures to 150 psi, temperatures as high as 500F.

Engineering Data Bulletin 611 has all the data on PropoMatics. Send for it — no obligation.

LESLIE REGULATORS AND CONTROLLERS
A SINGLE STANDARD OF QUALITY SINCE 1900
Leslie Co., 707 Grant Ave., Lyndhurst, New Jersey

TRADE LESLIE MARK

Circle 657 on postcard, page 33

DATA FILE OF LITERATURE FOR THE PLANT ENGINEER'S LIBRARY

STANDARD CATALOGS, bulletins and handbooks are described here to help plant engineers maintain a permanent data file. To order this free literature, use Reader Service Cards provided for you on pages 33-34.

MAINTENANCE

Long Run Paint Economy

Paint selection factors are detailed in the sixth edition of "Engineered Color," 20 pp. Covers proper use of paint and color, requirements of various surfaces, color and the safety program. Describes interior and exterior primers, finishers, varnishes, etc. Barreled Sunlight Paint Co.

For a copy, circle 301 on Post Card

Epoxy Chemical Resistant Enamel

Bulletin 1001 describes Corlar, an enamel for abnormal exposures to fumes, spillage and moisture. Covers characteristics, applications, coverage and preparation. E. I. du Pont de Nemours & Co., Inc.

For a copy, circle 302 on Post Card

Rust, Corrosion Control

This 32-pp comprehensive treatise (Form 259) on protective coatings shows actual color standards of company's primers and top coating. Covers water-resistant, heat-resistance floor coatings, heavy-duty chemical resistant coatings, galvanized metal coatings, wire fence roller coatings and quick-dry types. Contains 110 color chips. Rust-Oleum Corp.

For a copy, circle 303 on Post Card

Protective Coatings

Corrosion resistant coatings, treatments for floors, and coatings and waterproofing for masonry are described in 72-pp Form 990. Presents information on maintenance products for interiors, door coatings, exteriors, roofs, Truscon Laboratories Div., Devoe & Raynolds Co., Inc.

For a copy, circle 304 on Post Card

Epoxy Maintenance Coatings

Chemical and physical properties of epoxy systems used in industrial maintenance coatings are detailed in a bulletin called "What are Epoxies?". Epoxy resins used in these formulations are covered. Hauger-Beegle Associates, Inc.

For a copy, circle 305 on Post Card

Sanitary Wall Coating

Ceramic-like coating for use on cement, cement block, brick, plaster, wood and composition is described in this product bulletin, covering properties. The Master Mechanics Co.

For a copy, circle 306 on Post Card

Pyramid Ladders, Platforms

Catalog 159, 20-pp, describes pyramid-design step ladders, hydraulic lifts and fixed or adjustable-level work platforms for above-floor working safety. Ballymore Co.

For a copy, circle 307 on Post Card

LUBRICATION

Organized Lubrication Benefits

Major cost control factors of organized lubrication are told in this 24-pp bulletin. Covers cost control opportunities, assigning responsibilities. Texaco, Inc.

For a copy, circle 308 on Post Card

Lubricating Manual

Function and properties of lubricants and selection of lubricants for lubricated plug valves are covered in this 12-pp manual. Lubricant selection chart included. Walworth Co.

For a copy, circle 309 on Post Card

Heavy-Duty Lithium-Base Grease

Booklet SP-9489, 8 pp, describes a heavy-duty, multi-purpose lithium-base grease for use where loads are high, shock loads may occur, and where machine element action is oscilating. Gulf Oil Corp.

For a copy, circle 310 on Post Card

Multi-Purpose Greases

Information on six Litholine greases is presented in this product bulletin. Sinclair Refining Co.

For a copy, circle 311 on Post Card

Extreme-Pressure Lubricant

Properties and applications of a semi-fluid extreme-pressure lubricant are detailed in Technical Bulletin 64. Specification data. Sun Oil Co.

For a copy, circle 312 on Post Card

Centralized Lubrication Equipment

Featured in 32-pp Catalog 82 is fully-automatic, semi-automatic and manual lubrication equipment, including high and low-pressure lubricant injectors, timing and alarm controls and filler pumps and accessories. Lincoln Engineering Co.

For a copy, circle 313 on Post Card

TOOLS, MACHINE SHOP

Industrial Wrenches, Hand Tools

Over 4000 items for production and maintenance are presented in 180-pp Catalog 60-1, including sockets and shanks for use on impact and nut setting wrenches, standard wrenches and tools, shop equipment, hydraulic pullers, electric drills, grinders, sanders, etc. Snap-On Tools Corp.

For a copy, circle 314 on Post Card

Pipe Tool Guide

Application data on Ridgid pipe tools is provided in 16-pp Catalog 7596R-6. Wrenches, cutters, threaders, reamers, vises and others are illustrated. The Ridge Tool Co.

For a copy, circle 315 on Post Card

Fastening Tool

Illustrated in Catalog Form B-141 is the Duo-Jobmaster for tough fastening jobs into steel or concrete. Features, advantages detailed. Ramset Div., Olin Mathieson Chemical Corp.

For a copy, circle 316 on Post Card

Industrial Maintenance Equipment

Maintenance equipment for pulling-installing operations is described in 24-pp Catalog P-9. Includes specifications on pullers, push-pullers, puller adapters, pulling attachments, hydraulic rams and cylinders, pumps, industrial maintenance sets, etc. Owatonna Tool Co.

For a copy, circle 317 on Post Card

Disposable Wipers

Applications of disposable wipers for general purpose wiping, cleaning and polishing are illustrated and described in 12-pp product bulletin. Kimberly-Clark Corp.

For a copy, circle 318 on Post Card

CONSTRUCTION

Foundation Product Guide

Three basic types of foundation products—pipe piles, caissons and helically corrugated pile shells—are described in 20-pp Catalog FP-13559. Typical applications included. Armco Drainage & Metal Products, Inc.

For a copy, circle 320 on Post Card

Permanent Roofing, Siding

Application information and design data for Asbestone 400 corrugated asbestos, cement roofing and siding are presented in 40-pp Manual File 12-F. Covers construction and characteristics of fire-proof, corrosion-proof roofing and siding material, including interior and exterior uses. National Gypsum Co.

For a copy, circle 321 on Post Card

Built-Up Roofing Specifications

General requirements for built-up roofing are covered in this 28-pp 1961 manual, with roof selector guide and application information. Covers steep deck and dead level roofs, spray pond roofs, promenade tile roofs, roofing over existing roofs, insulation. The Philip Carey Mfg. Co.

For a copy, circle 322 on Post Card

Basic-Roofing Information

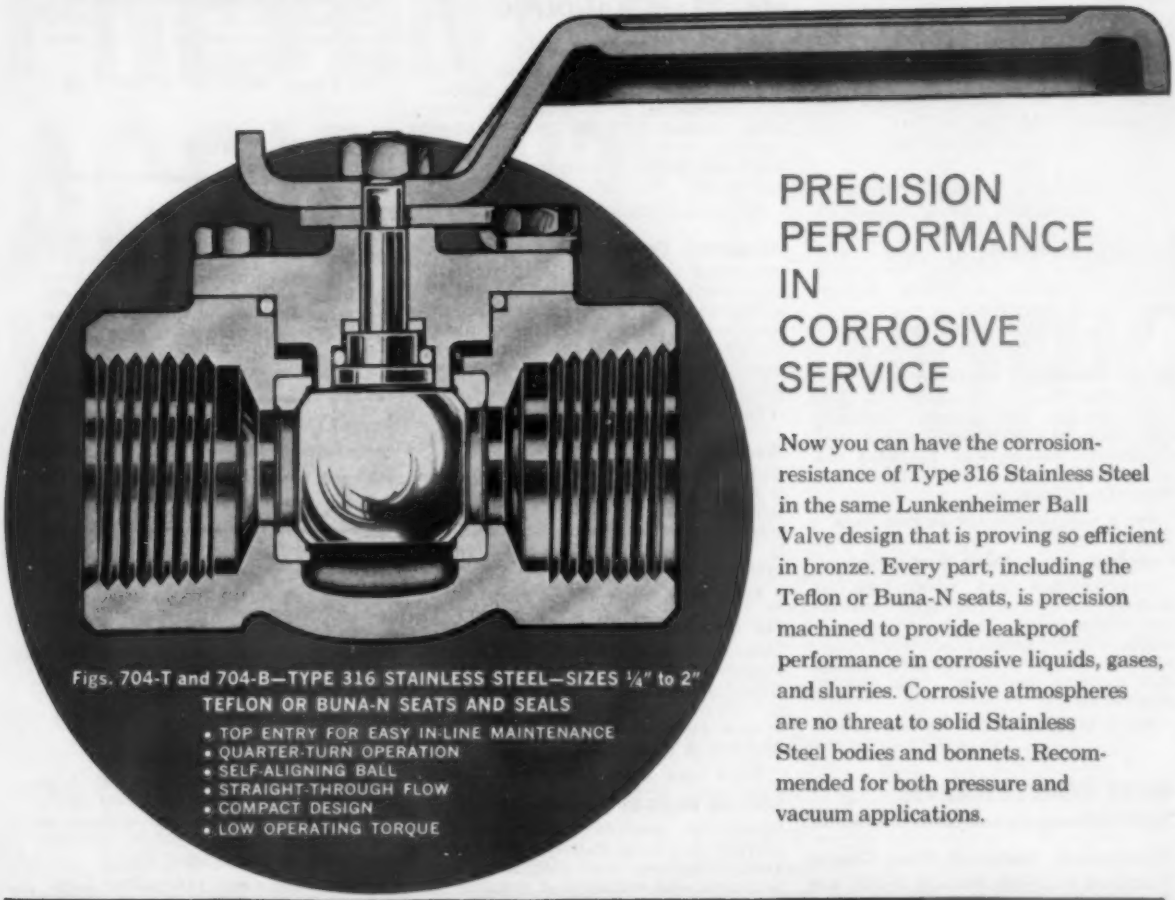
"What You Should Know About Your Roof" is a 40-pp booklet telling what makes a roof fail, how to recognize roof deterioration and what to do to keep a roof in good condition. Johns-Manville Corp.

For a copy, circle 323 on Post Card

Cold Storage Doors

Advantages of Electroglide electric horizontal sliding doors for cooler

NEW LUNKENHEIMER STAINLESS STEEL BALL VALVE



Figs. 704-T and 704-B—TYPE 316 STAINLESS STEEL—SIZES ¼" to 2"
TEFLON OR BUNA-N SEATS AND SEALS

- TOP ENTRY FOR EASY IN-LINE MAINTENANCE
- QUARTER-TURN OPERATION
- SELF-ALIGNING BALL
- STRAIGHT-THROUGH FLOW
- COMPACT DESIGN
- LOW OPERATING TORQUE

PRECISION PERFORMANCE IN CORROSIVE SERVICE

Now you can have the corrosion-resistance of Type 316 Stainless Steel in the same Lunkenheimer Ball Valve design that is proving so efficient in bronze. Every part, including the Teflon or Buna-N seats, is precision machined to provide leakproof performance in corrosive liquids, gases, and slurries. Corrosive atmospheres are no threat to solid Stainless Steel bodies and bonnets. Recommended for both pressure and vacuum applications.

LUNKENHEIMER®
THE ONE Great NAME IN VALVES
• BRONZE • IRON • STEEL • PVC

LUNKENHEIMER L QUALITY

Get Circular 612 from your distributor or The Lunkenheimer Co., Cincinnati 14, Ohio.

L-561-24

Circle 658 on postcard, page 33

DATA FILE

(Begins on page 242)

and freezer operation are detailed in this 6-pp bulletin. Includes table of sizes. Jamison Cold Storage Door Co.

For a copy, circle 324 on Post Card

Cold Storage Doors

Power operated and manual cold storage doors are illustrated and described in Catalog 261. Construction explained. Clark Door Co., Inc.

For a copy, circle 325 on Post Card

Acrylic Plastic Sheet

Properties and characteristics of Plexiglas acrylic plastic sheet are detailed in 12-pp Booklet PL-415. Applications shown. Rohm & Haas Co.

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Functional Glass for Industry

Advantages of rolled, figured and wired glass for vertical sidewall and skylight glazing are detailed in Catalog 61-G, 20 pp. Describes types suited for industrial applications. Mississippi Glass Co.

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Aluminum Stair Treads, Grating

Details on aluminum stair treads and grating featuring one-piece construction are presented in Bulletin AD-679. Types of finishes, sizes and weights available are listed. Aluminum Co. of America.

For a copy, circle 328 on Post Card

Screw Fastening of Aluminum

This 48-pp technical handbook covers standard and special fasteners and fastening systems used to join aluminum assemblies. Includes list of manufacturers of screw fasteners. Reynolds Metals Co.

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Copolymerized Floor Surfacing

Characteristics and advantages of Monile copolymerized floor surfacing which resists water, oil, grease, acids, alkalis, salts, heavy traffic, vibrations and shock are detailed in this product bulletin. The Master Mechanics Co.

For a copy, circle 330 on Post Card

WIRE ROPE, CHAINS, SLINGS

Customized, Standard Sling Chains

Featured in 20-pp Catalog S-261 are Cam-alloy, wrought iron and steel sling chains, also new Sentry chains with overload warning ring. Includes tips on care and use of sling chains, coding symbols. Campbell Chain Co.

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Wire Rope Guide

Catalog WR-722 presents 28-pp of information on characteristics, constructions, and grades of wire rope. Provides breaking strengths, safe working loads for industrial, other use. The Colorado Fuel & Iron Corp.

For a copy, circle 332 on Post Card

Use and Abuse of Wire Rope

Correct use of wire rope, and abuses that shorten wire rope life, are illustrated with cartoon caricatures in this 28-pp handbook. Information on rope and sling saving is included. Union Wire Rope Corp.

For a copy, circle 333 on Post Card

Manual on Wire Rope

Inspection of wire rope, methods of lubricating wire rope, use and abuse of wire rope and sheave maintenance are among subjects covered in 188-pp Wire Rope Manual, Catalog G-16. Sections are devoted to strengths and weights of wire rope, cable assemblies and rated capacity of slings. Manual is available to qualified plant engineers. Macwhyte Wire Rope Co.

For a copy, circle 334 on Post Card

MATERIALS HANDLING

Continuous Flow Systems

Illustrated and described in 32-pp Catalog 860 are typical installations of continuous flow materials handling systems. Covers roller, wheel and belt conveyors, chain conveyors, overhead trolley conveyors, elevating conveyors. Mathews Conveyer Co.

For a copy, circle 335 on Post Card

Integrated Conveyor System

Presented in 22-pp Bulletin 112 is a conveyor system with "off-the-shelf" units that fit together as integrated components. Describes three plans for selecting the pre-engineered, prefabricated components to suit plant needs. Standard Conveyor Co.

For a copy, circle 336 on Post Card

Modernized Bulk Handling

Bulletin 532, 6 pp, describes combination and suction-type pneumatic conveyor systems with examples of installations ranging from automatically controlled 11-system to a small system. Dracco Div., Fuller Co.

For a copy, circle 337 on Post Card

For Overhead Handling

Illustrated Bulletin 15005, 20 pp, describes Load Lifter cranes from small capacity single girder crane bridges to large capacity double girder cranes. Specifications given. Manning, Maxwell & Moore, Inc.

For a copy, circle 338 on Post Card

500- to 4000-lb Capacity Hoists

Speedway electric hoists are described in 12-pp Bulletin DH-133-F. Design features and details on suspensions and conducting systems included. Wright Hoist Div., American Chain & Cable Co., Inc.

For a copy, circle 339 on Post Card

Wire Rope Electric Hoists

Six-pp Bulletin 905 describes electric wire rope hoists in capacities to 2 tons. Gives specifications, mounting options and sectionals. Hoist & Crane Div., Robbins & Myers, Inc.

For a copy, circle 340 on Post Card

Vertical Transportation

Selection of vertical transportation for every traffic-moving job is detailed in 32-pp Bulletin A-382. Various elevators and escalators are described. Otis Elevator Co.

For a copy, circle 341 on Post Card

For Handling Stacked Sheets

Bulletin 1208B-N shows how company's magnetic sheet floater works and tells advantages in operations involving stacked steel sheets. Dings Magnetic Separator Co.

For a copy, circle 342 on Post Card

Why Self-Dumping Hoppers

Cost-saving advantages of self-dumping steel hoppers for bulk handling are detailed in Bulletin 265. Roura Iron Works, Inc.

For a copy, circle 343 on Post Card

Caster and Wheel Manual

Detailed engineering data and specifications on casters and wheels for all types of applications, including light and heavy duty industrial types, are presented in 192-pp Manual 66. Darnell Corp., Ltd.

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STORAGE, SHOP EQUIPMENT

Steel Storage Equipment

Reference Manual 487 contains 64 pp of data on shelving, bins, doors, slotted angle, drawer units, lockers, benches, grating, counters, others. Assembly details and dimensions provided. Equipto.

For a copy, circle 346 on Post Card

Any of these bulletins, catalogs and technical booklets can be yours without cost or obligation. Use the Reader Service Cards on page 34.

Steel Equipment Selection

Catalog 100 K contains 100 pp of detailed information on steel cabinets, folding chairs, work benches, tool stands, shelving, tool storage, lockers, coat racks, filing cabinets, bins. Lyon Metal Products, Inc.

For a copy, circle 347 on Post Card

Steel Shelving and Equipment

Illustrated in 8-pp Form 2715 is quick-erection, adjustable steel shelving for maximum space saving, as well as tool stands, benches, cabinets. Standard Pressed Steel Co.

For a copy, circle 348 on Post Card

Controlling Storage Losses

"12 Losses Penco Planning Can Control," 12 pp, pinpoints storage system objectives and tells how to achieve them. Well illustrated, shows how proper steel storage equipment can speed inventory, save space, control theft, promote safety. Penco Div., Alan Wood Steel Co.

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THIS FREE BOOK COULD HELP PREVENT AN ACCIDENT WHERE YOU WORK

You owe it to yourself, and the men you supervise, to learn all about the safety, comfort, and economy of USS Multigrip Safety Floor Plate. This free booklet illustrates the many applications for Multigrip—from plant floors to derrick platforms to ship ladders. What you see in these pages may help prevent an accident in *your* future. For a personal copy of the USS Multigrip booklet, fill out the coupon at right.

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DATA FILE

(Begins on page 242)

Storage Racks

Bulletin R-400, 12 pp, illustrates and describes a variety of storage racks. Application drawings, photos included. Chicago Tramrail Corp.

For a copy, circle 350 on Post Card

Prefabricated Storage Rack

Advantages of prefabricated modular rack storage components are described in 16-pp Form AD-409. Explains how all-purpose rack installation can utilize maximum floor space without sacrificing access. Acme Steel Co.

For a copy, circle 351 on Post Card

DUST, FUME CONTROL

Dust Control Systems

Bulletin 104, 36-pp, on dust filters, gives information on dust control systems and how to engineer them. Describes the Roll-Clean Dynaclone dust filter. The W. W. Sly Mfg. Co.

For a copy, circle 352 on Post Card

Cabinet Dust Collectors

Self-contained cloth-filter type dust collectors are described in 6-pp Bulletin 359. Torit Mfg. Co.

For a copy, circle 353 on Post Card

Dust Collection, Recovery

Product data on dust collection, precipitation and gas scrubbing equipment covers electrical precipitators, mechanical dust collectors, others. Western Precipitation Corp.

For a copy, circle 354 on Post Card

ELECTRICAL

Pump Motors and Drives

Condensed specification data on pump motors and drives is presented in 20-pp Form F-2002. Keyed index pages give selection data on specific pump motors and drives, including ratings, dimensions, thrust capacities, speeds, frame sizes, ratios. U. S. Electrical Motors Inc.

For a copy, circle 355 on Post Card

Distribution Transformers

Dry type distribution transformers, single and three phase, are featured in 16-pp Bulletin 5A2-BL01. Wiring diagrams provided. Acme Electric Co.

For a copy, circle 356 on Post Card

Control Units

Featured in illustrated 28-pp Publication LO-104 are pushbuttons, indicating lights and selector switches offering compact design, flexibility and durability. Detailed selection data provided. Cutler-Hammer, Inc.

For a copy, circle 357 on Post Card

Enclosed Switches

Catalog 83, 22p, Catalog 84, 16 pp, and Catalog 101, 24 pp, cover enclosed switches, including general types for a-c or d-c applications, sealed switches, heavy-duty limit switches, hand operated switches, others. Micro Switch, Div., Minneapolis-Honeywell Regulator Co.

For a copy, circle 358 on Post Card

On Low Voltage Switchgear

Twenty-pp Bulletin 3200-1A gives comprehensive information on low voltage power circuit breakers and switchboards in unit ratings from 225 to 4000 amp. Application data, ratings and specifications included. I-T-E Circuit Breaker Co.

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Electrical Trolley Busway

Design and installation details on a flexible trolley busway system and crane and hoist electrification system for distributing electrical power are presented in 42-pp Bulletin 85. Includes installation photos, diagrams, specifications. Feedrail Corp.

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Basic Electrical Protection

Form BPB, 10-pp, gives information on interrupting capacity, speed of response, current limitation, motor protection, system selectivity to faults, fuse applications and selection. Bussmann Mfg. Co.

For a copy, circle 361 on Post Card

Rubber Power Cable

This 32-pp catalog contains information on design features, insulations and performance highlights of butyl rubber power cable. Includes data on available constructions, ampacity etc. Anaconda Wire & Cable Co.

For a copy, circle 362 on Post Card

Data on Sheathed Cables

Construction details and performance information on sheathed cables, available in steel, copper, aluminum and bronze, are presented in Bulletin 1031, 16-pp. Engineering data included. Simplex Wire & Cable Co.

For a copy, circle 363 on Post Card

Safety Mineral Insulated Cable

Bulletin S-2-60, 20-pp, describes properties, applications, installation, construction and performance characteristics, and wiring specifications of mineral insulated cable for hazardous locations. Mineral Insulated Wire Div., General Cable Corp.

For a copy, circle 364 on Post Card

Flexible Electrical Conduit

Performance and application data on Liquatite, the flexible plastic covered electrical conduit, is featured in this bulletin. Electri-Flex Co.

For a copy, circle 365 on Post Card

Industrial Truck Batteries

A three dimensional die-cut in the center of 12-pp Bulletin IT-531 shows industrial truck battery construction. Catalog also gives mechanical and electrical specifications for the complete line of batteries. C & D Batteries, Div., The Electric Autolite Co.

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MAGNETIC SEPARATION

Stop tramp iron damage before it costs you money
LET DINGS DO IT.

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The "other guy" was a crusher. The unhappy owners learned the hard way that lazy tramp iron has no respect for costly, hard working machinery.

Any plant *without* a magnetic separator need only compare the cost in both repair and production delay—with the cost of a magnet.

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Dings

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4766 West Electric Avenue, Milwaukee 46, Wis.

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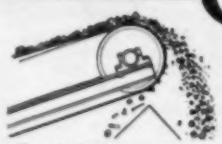

Here's just one way—
Dings magnetic pulleys, electro or permanent, are at work pulling unwanted iron out of everything from grain to cotton...to chemicals and molybdenum ore.

PE-161R

Circle 661 on postcard, page 33

Warn workers of **Electrical Hazards** with **Stonehouse Signs**

Electricity is an invaluable aid to industry, but it takes constant warning with Stonehouse ELECTRICAL HAZARD Signs to teach workers to safeguard themselves from injury.

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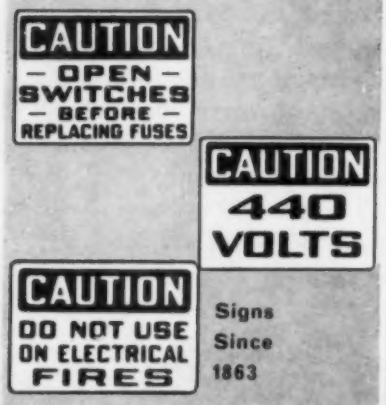

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9th and Larimer Streets, Denver 4, Colorado

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DATA FILE

(Begins on page 242)

Silicon Rectifier Chargers

Advantages and characteristics of silicon rectifier chargers available in sizes for any standby battery application in telephone, utility, emergency lighting and other fields are in Bulletin Section 57.01. Exide Div., The Electric Storage Battery Co.

For a copy, circle 367 on Post Card

Industrial Truck Batteries

Construction features and advantages of industrial truck batteries with silconic plate for longer battery life are detailed in 24-pp Bulletin GB-1567D. Includes curves showing discharge characteristics of battery types. Gould-National Batteries, Inc.

For a copy, circle 368 on Post Card

For Insulator Protection

Bulletin 4-218 tells how Dow 5 compound applied to pole line insulators and electric equipment bushing protects against excessive leakage, flashovers, and service interruptions in areas where atmospheres are contaminated by industrial dust or other particles. Dow Corning Corp.

For a copy, circle 369 on Post Card

Electrical Equipment Data

Twenty-pp Publication PL-12-29 gives installation and application data on fuse panels, service entrance equipment and general-purpose, general toggle, safety and double-throw switches. Engineering information included. The Clark Controller Co.

For a copy, circle 370 on Post Card

Data on Electrical Equipment

Conduit bodies and fittings, connectors, ground fittings, EMT fittings and other electrical products are detailed in 48-pp Catalog 9. Dimensional data and features are given. Gedney Electric Co.

For a copy, circle 371 on Post Card

Electrical Equipment Digest

Presented in 168-pp Catalog Digest 143 are load centers, circuit breakers, low voltage control, fusible service equipment and accessories, meter sockets and troughs, safety switches, panelboards, duct and fittings, starters. Square D Co.

For a copy, circle 372 on Post Card

Plant Electrical Testing Instruments

Twelve-pp Catalog 10-1.3 covers instruments for maintenance installation and proof-testing of plant electrical equipment. Di-electric breakdown test sets from heavy duty types with a-c or d-c potentials to 150 kv, through mobile, bench and portable models included. Megohmmeters to 5,000,000 megohms are presented. Associated Research, Inc.

For a copy, circle 373 on Post Card

Inverted-Y Electrification

Aluminum inverted-Y conductor systems discussed in Form 2025A, 8 pp, are available for 500-1200 amp, continuous rating, 600-v for wall and ceiling mounting in dry places. The Cleveland Crane & Engineering Co.

For a copy, circle 374 on Post Card

Cable Support Equipment

Described in 28-pp Catalog 5912 are two types of cable trays or tube raceways—the ladder type and the basket small opening type—for cable, wiring and tubing support. Includes dimensions. The Globe Co.

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LIGHTING

Modern Lighting Needs

"Footcandles in Modern Lighting" is a 20-pp booklet giving lighting level recommendations for seeing tasks involved in many activities. Figures based on findings of Illuminating Engineering Research Institute and Illuminating Engineering Society. General Electric Co.

For a copy, circle 376 on Post Card

Lighting Selector

This 24-pp lamp and lighting guide for plant and office lighting, tabulates recommended illumination levels, and tells how to obtain them with fluorescent, mercury or filament lamps. Graybar Electric Co., Inc.

For a copy, circle 377 on Post Card

Area Floodlighting Guide

Planning for lighting of parking areas, construction sites, and other open areas is detailed in 16-pp Bulletin 2719. Contains reference guides for selecting incandescent or mercury floodlights, general purpose or heavy duty types, and for determining how many floodlights are needed. Crouse-Hinds Co.

For a copy, circle 378 on Post Card

Industrial Fixtures

This 1961 Catalog, 24-pp, describes lighting fixtures for commercial and industrial applications. Selection tables, industrial hangers and accessories. Day-Brite Lighting, Inc.

For a copy, circle 379 on Post Card

New Light, More Light

Fluorescent lights designed to offer most light for the money are featured in this product bulletin. Includes eye sensitivity curve, comparative output chart. Westinghouse Electric Corp.

For a copy, circle 380 on Post Card

Protected Incandescent Lighting

Illustrated and described in 20-pp Bulletin 1 are explosion-proof incandescent lighting units for hazardous applications, as well as dust-tight and moisture-proof units, heavy-duty, vapor-tight units. Selection tables provided. Benjamin Div., Thomas Industries Inc.

For a copy, circle 381 on Post Card

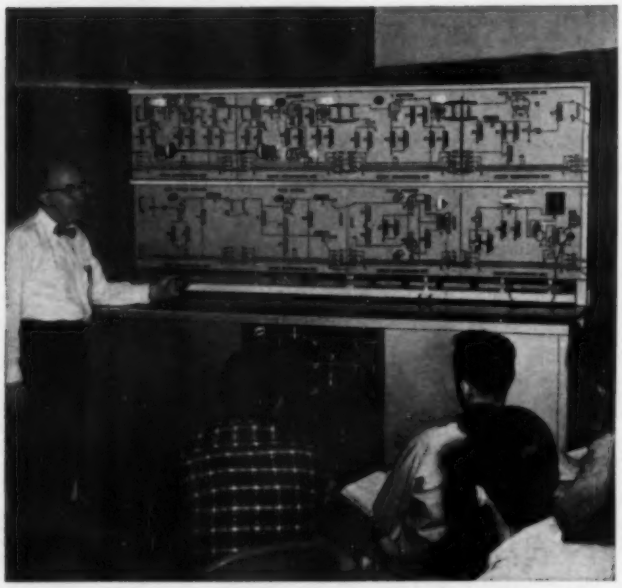
Emergency Lighting Systems

Twenty-pp Publication 243A features emergency lighting systems for industrial and other buildings. Infor-

How to set up an ELECTRONICS MAINTENANCE TRAINING PROGRAM

for your automatic control system

One training program conducted in your plant or facility can meet all your electronics maintenance training needs . . . regardless of how many makes and types of equipment you have installed!



Philco Electronics Demonstration Unit presents the circuits of electronics equipment and systems a step at a time for easy-learning. Basic circuits are presented individually on separate "building block" panels. These are then combined on the racks of the Demonstration Unit to build complete and operating systems. Anything from a simple communications system to a complex electronic computer can be taught with this step-by-step method.

One training program tailored to your specific automatic control system is all you need to train your own electronics maintenance organization . . . and courses can be conducted in your own plant or facility. Your own personnel can be trained to conduct the courses, so you have an electronics maintenance training capability within your company for all future needs.

Your training program can be prepared and set up in a minimum of time by training specialists from Philco TechRep Division, regardless of the makes and types of equipment involved. This specialized technical training organization has been developing and conducting electronics training programs since the early days of World War II. During these two decades, effective technical training methods, materials, and teaching aids have been developed and perfected . . . and are currently in use in all 50 states and at least 25 foreign countries.

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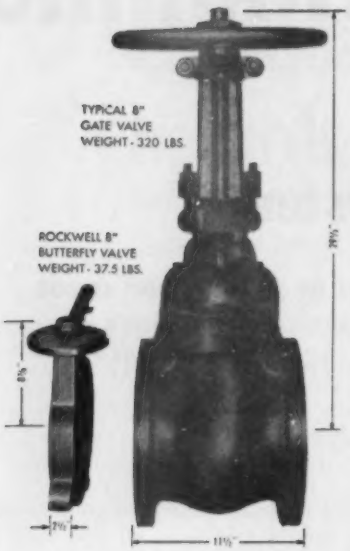
Circle 663 on postcard, page 33

Compare them
✓ for Weight
✓ for Space



This Rockwell resilient-seated wafer butterfly valve and the large gate valve are both 8" pipe size. Both do the same job. But what a difference in weight, space—and cost.

What does this mean? It means a 60 to 80 per cent reduction in weight in favor of the butterfly valve, depending on size.

As for space, the 8" butterfly valve requires but 8⅜" from center line of pipe for clearance, whereas the gate valve requires over 37" from center line for clearance, when the valve is open.

There are other advantages, too: A quarter turn opens and closes the butterfly valve. The gate valve, however, requires many turns. And operation is easier; maintenance is lower.

Fact-packed Bulletin 590X tells more. Write for it.

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Made and sold in Europe by
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Circle 664 on postcard, page 33

DATA FILE

(Begins on page 242)

mation on components included. The Standard Electric Time Co.

For a copy, circle 382 on Post Card

Lighting Maintenance Tips

Principles and advantages of good lighting practice are presented in 48-pp revised lighting manual. Provides a guide to trouble shooting fluorescent installations, with a section to group replacement of lamps. Champion Lamp Works.

For a copy, circle 383 on Post Card

INSTRUMENTS, CONTROLS—

Electronic Control System

Eight-pp Bulletin 10 describes an electronic control system which measures, transmits, indicates, records and controls pressure, temperature, differential pressure, oxygen concentration, liquid level, gas analysis, flow and pH. Robertshaw-Fulton Controls Co.

For a copy, circle 384 on Post Card

Variable Area Flow Meters

Twenty-pp Catalog 520.100, on glass-tube type Varea-meters, contains information on industrial applications, features and details of several tube and float types. Provides selection and data. Wallace & Tiernan Inc.

For a copy, circle 385 on Post Card

Tank Contents Gaging

Bulletin 463A describes remote and direct reading systems, including hydrostatic, hydraulic and direct reading gages. The Liquidometer Corp.

For a copy, circle 386 on Post Card

Alarm Indicating Monitor

Eight-pp Bulletin MSP-195 features an alarm indicating monitor for equipment, manpower and space protection by steel refineries, chemical, electrical and cold storage plants. Hagan Chemical & Controls, Inc.

For a copy, circle 387 on Post Card

Valve Actuating Unit

Catalog V-200 describes the Valvmatic, a unit designed for converting hand-operated valves to automatic operation. C. H. Wheeler Mfg. Co.

For a copy, circle 388 on Post Card

VALVES, TRAPS, PIPING AND FITTINGS—

Stainless Steel Valves

Catalog 59SS, 32 pp, on stainless steel valves, illustrates design and construction features. Details advantages in withstanding corrosive atmospheres. Jenkins Bros.

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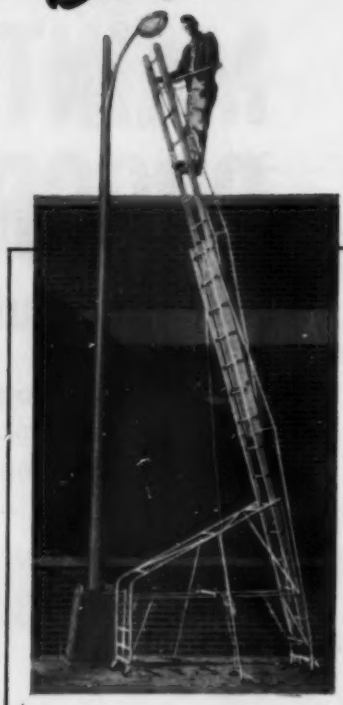
Solder End Valves

Illustrated Circular 603 describes bronze solder end valves: globes, 150

FOR MORE USES... MORE SAFETY— BUY Bally-Hi



Open construction design allows the "Bally-Hi"—a two-stage ladder mounted on a wheeled frame—to move between and over obstacles such as machines—where ordinary ladders can't go. Collapsible outriggers prevent tipping. Reaches heights to 25 ft., anchors to floor firmly, goes through average size doorways when collapsed. Equipped with extra safety and comfort features that contribute to the user's sense of security. "Bally-Hi" may be truck-mounted.

Ballymore "Safety-Step" ladders serve industry.

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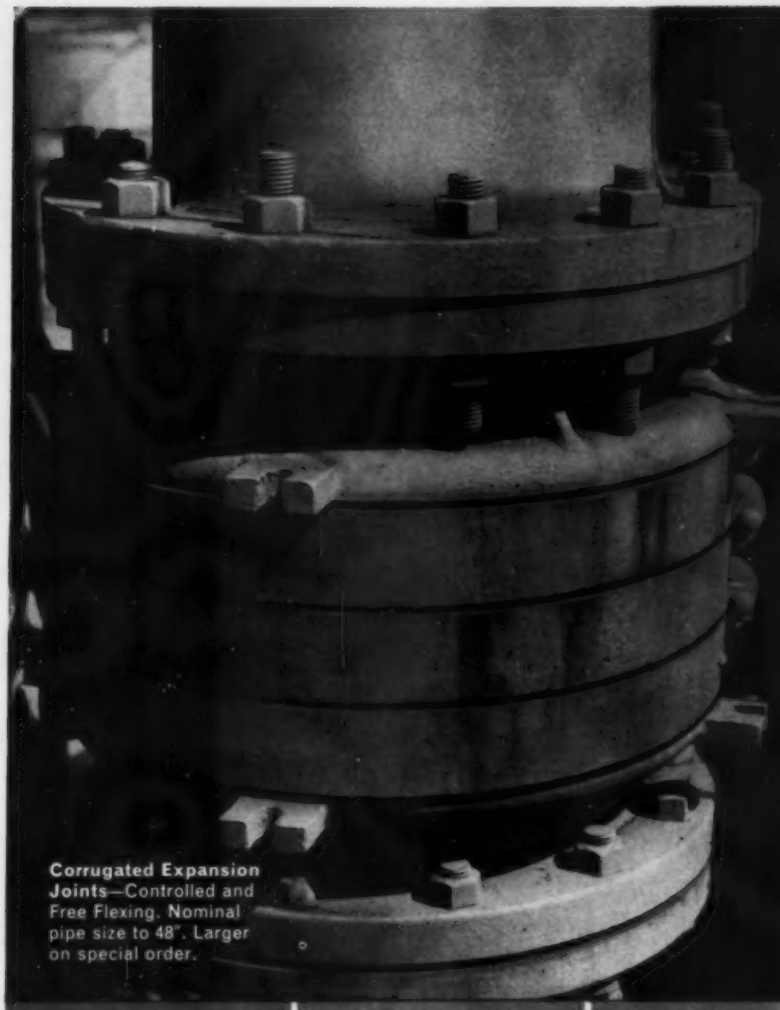

Corrugated Expansion Joints—Controlled and Free Flexing. Nominal pipe size to 48". Larger on special order.

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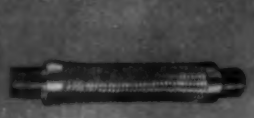
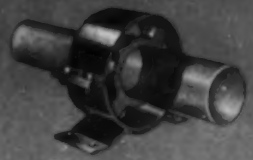
FIVE SOLUTIONS TO PIPE MOVEMENT PROBLEMS

Flexonics . . . and only Flexonics offers you one responsible source to insure sound piping installations where thermal expansion and contraction, vibration, and other forms of pipe motion exist. Mail the coupon for your FREE copy of the new Flexonics Engineering Guide . . . 42 pages of pipe motion calculations, tables, anchoring and guiding data.

Expansion Compensators—Low and high pressure models. Available in steel, all stainless steel, and bronze.



Flexible Connectors—Bronze and hot dipped galvanized steel. Pipe size to 14". Nipple, weld, or flange ends.



Pipe Alignment Guides—All steel construction for pipe size ¾ to 24". Moves axially in segmented steel cylinder.

Roller Pipe Insulating Supports—All steel, formed saddle. Pipe sizes ¾" to 14". Larger sizes on special order.

Flexonics

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FLEXIBLE METAL and SYNTHETIC HOSE EXPANSION JOINTS
BELLOWS • SPECIAL TUBULAR ASSEMBLIES

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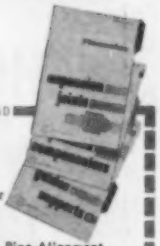

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Please send me Flexonics Engineering Guides and other information in the areas that I have checked:

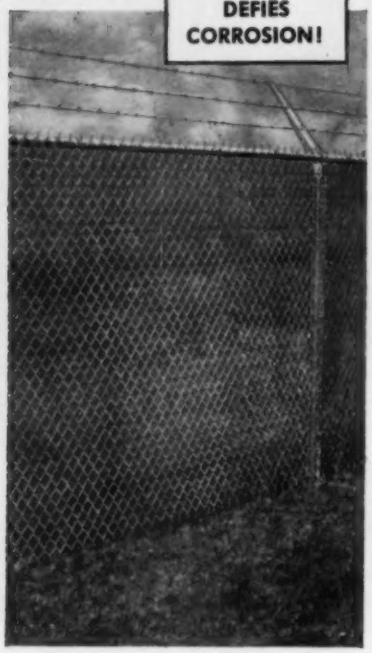
- ☐ Flexonics Expansion Joints
- ☐ Pipe Alignment Guides & Supports
- ☐ Flexonics Expansion Compensators
- ☐ Flexonics Flexible Connectors

Circle 666 on postcard, page 33

NOW!

ALL ALUMINUM CHAIN LINK FENCE

NO PAINTING! • DEFIES CORROSION!



Aluminum cuts your maintenance costs on fencing to nearly nothing! And new high-strength alloys assure a fence that will stand solid, straight and handsome through the years!

That's why Aluminum Chain Link is specified for more and more industrial plants, highways, parks and playgrounds.

Call your Anchor Man for more information. Write for free catalog: Anchor Fence, Dept. PE9, 6661 Eastern Ave., Baltimore 24, Maryland.

ANCHOR FENCE made of REYNOLDS ALUMINUM

Watch Reynolds TV show: "HARRIGAN AND SON," Friday evenings, ABC-TV Network.

Circle 667 on postcard, page 33

DATA FILE

(Begins on page 242)

lb SP- 300 lb WOG; gates, 125 lb SP - 200 lb WOG; checks, 125 lb SP - 200 lb WOG. Includes full dimensions. The Lunkenheimer Co.

For a copy, circle 391 on Post Card

Improved Butterfly Valves

Resilient-seated butterfly valves for applications where positive tight closure counts are illustrated in Bulletin 590X. Outstanding features detailed. W. S. Rockwell Co.

For a copy, circle 392 on Post Card

Pinch Valves

Construction features of Massco-Grigsby pinch valves are explained and illustrated in 14-pp Catalog 609. Provides sleeve service recommendations and specifications for manual, motorized, hydraulic types. Mine and Smelter Supply Co.

For a copy, circle 393 on Post Card

For Heat, Process Applications

Bulletin 561-C describes a diaphragm operated pressure reducing valve for steam heat and process steam applications. Design advantages are detailed and specifications capacity data included. Leslie Co.

For a copy, circle 394 on Post Card

Rigid Plastic Pipe

Bulletin HT-100, 6 pp, describes a rigid plastic pipe for high temperatures, pressures. Pictures typical applications and provides installation information. Carlon Products Corp.

For a copy, circle 395 on Post Card

Steam Trap Selector

Thirty-two-pp impulse steam trap selector for petroleum processing equipment contains detailed information on how to select, size and install steam traps. Trap recommendations, capacity tables and piping diagrams are also included. Yarnall-Waring Co.

For a copy, circle 396 on Post Card

Manual on Steam Traps

Calalog K, 48 pp, on steam traps, provides information on open flat and thermostatic types, pipe strainers. Discusses fundamentals of steam trapping, selection, installation; includes steam pipe sizing tables. Armstrong Machine Works.

For a copy, circle 397 on Post Card

Steam Traps, Regulators

This 12-pp condensed catalog contains technical and capacity data on steam traps, temperature regulators and heating specialties. Cutaway views and diagrams are included. Sarco Co., Inc.

For a copy, circle 398 on Post Card

Trap Strainer Applications

Bulletin 601, 8 pp, gives case histories of trap strainer applications. Covers size, straining media, materials of construction, housing, screens. Multi-Metal Wire Cloth Co., Inc.

For a copy, circle 399 on Post Card

Steam Traps and Strainers

Catalog 400, 24 pp. provides streamlined data on thermostatic and expansion steam traps and strainers, covering function, operation, applications. Features a new trap sizing method and covers selection for steam service, air and liquid heating, direct and indirect steam contact heating. W. H. Nicholson and Co.

For a copy, circle 400 on Post Card

How to Make Ends Meet

Catalog-Manual 60, 34 pp, presents a simple and efficient method of installing pipe. Coupling fittings and tools utilized are detailed. Shows how method is adaptable to various pipe. Victaulic Co. of America.

For a copy, circle 401 on Post Card

Couplings, Fittings, Piping Products

Form 259 contains product information, installation instructions specifications, illustration of such applications as fuel and supply lines, materials handling piping. Dresser Mfg. Div., Dresser Industries, Inc.

For a copy, circle 402 on Post Card

Engineering Manual on Traps

This 40-pp manual is designed to assist in the sizing, specifying and selection of steam traps and other fluid specialties. Includes steam trap selection guide with explanation of four basic types of traps and how they perform. The V. D. Anderson Co.

For a copy, circle 403 on Post Card

PROCESSING, FINISHING—

For Processing, Heat Transfer

Description and specifications on laboratory and production blenders, vacuum tumble dryers, packaged pilot plants, process heat exchangers, solids-processor, and general-purpose solids-flo valve are presented in 20-pp BBulletin 16-P. The Patterson-Kelley Co., Inc.

For a copy, circle 404 on Post Card

Flame Spraying Processes

Basic engineering and application data on flame-sprayed coatings of metals, ceramics, carbides and other high-melting-point materials are presented in 16-pp Bulletin 136B. Includes charts. Metco, Inc.

For a copy, circle 405 on Post Card

For Process Industries

Products for chemical processing industries are described in 12-pp Bulletin G-3E. Covers pumps, pneumatic conveyors, fluidizing conveyors, rotary compressors, vacuum pumps, horizontal grate coolers, suspension-type pre-heaters, blowers, fans and exhausters. Fuller Co.

For a copy, circle 406 on Post Card

For Heat Processing

Finishing system, ovens and furnaces used in heat processing are featured

in this 8-pp Bulletin B. Illustrations of installations provided. Despatch Oven Co.

For a copy, circle 407 on Post Card

Finishing Equipment

Contained in this file folder is a series of product bulletins on manual and automatic finishing equipment, including spray guns, nozzles, pumps, tanks, heaters, air compressors, regulators, hose. The De Vilbiss Co.

For a copy, circle 408 on Post Card

Finishing, Processing Equipment

Industrial Equipment Catalog A-661 covers finishing and processing equipment and systems. Metal cleaning, surface preparation, pickling or rustproofing, spray booths; drying, baking and processing ovens; control components; dust and fume-control equipment. The R. C. Mahon Co.

For a copy, circle 409 on Post Card

MECHANICAL POWER TRANSMISSION

Adjustable Speed Fluid Drives

Bulletin 9819, 8-pp, describes adjustable speed Gyrol fluid drives, 1- to 25-hp, giving advantages, applications, components and operation. Industrial Div., American-Standard.

For a copy, circle 410 on Post Card

Tips on V-Belt Drives

Twelve-pp Bulletin DH-833 tells how to get the most from your V-belt drives. Benefits of a good maintenance program are detailed, and sections on selecting and installing V-belts, drive inspection and maintenance, and V-belt drive analysis chart included. The Gates Rubber Co.

For a copy, circle 411 on Post Card

Machine Molded Pulleys

Solid and split construction iron pulleys for industrial applications are featured in 19-pp Catalog 1-C. Covers standard construction details, approximate pulley weights, dimensions, and prices. The J. B. Ehrsam & Sons Mfg. Co.

For a copy, circle 412 on Post Card

V-Belt Fabrication, Quality

Machines and processes involved in V-Belt fabrication are described in 16-pp Booklet S51106. Testing, inspection, and control of their quality are explained in another booklet, S51107. The Goodyear Tire & Rubber Co.

For a copy, circle 413 on Post Card

Flexible Cushion Couplings

Selection data for flexible cushion couplings that absorb vibrations and compensate for all combinations of shaft misalignment and end float are presented in 24-pp Bulletin 901B. Engineering drawings, horsepower ratings are also included. Dodge Mfg. Corp.

For a copy, circle 414 on Post Card

Anti-Friction Bearings

Catalog 424-D, 8-pp, gives capsule presentation of company's line of an-

"...our fence definitely discourages pilferage..."

SAYS EAST COAST BOTTLING COMPANY

"When this new soft drink plant went up in the fall of 1959, 700 feet of Anchor Fence were installed at the same time. The architect specified chain link for its durability and maximum protection features. The contractor selected Anchor Fence after competitive pricing. Our Anchor Fence prevents trespassers from short-cutting through the property and definitely discourages pilferage from trucks left in the yard overnight. The sliding gate is very valuable in helping us avoid traffic tie-ups."

Call your local Anchor office today for a talk with one of Anchor's trained sales engineers. Write for free catalogue to: ANCHOR FENCE, 6661 Eastern Avenue, Baltimore 24, Maryland.

ANCHOR FENCE

Division of ANCHOR POST PRODUCTS, INC.®

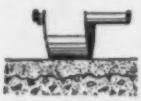
Plants in Baltimore, Md.; Houston, Texas; and Whittier, Cal. • Sold direct from factory branches in all principal cities.

Circle 668 on postcard, page 33

RESURFACED FLOORS IN PERFECT CONDITION AFTER 8 YEARS!

Permaflex solved the resurfacing problem for the Caterpillar Tractor Co., East Peoria, Illinois. Photo above shows no rutting, scaling or cracking despite great weight flooring has had to withstand over the years.

Will not RUT under 3000 PSI



Attesting to the indestructibility of hard mastic PERMAFLEX are thousands of industrial plants, freight yards, truck terminals, railroad stations, warehouses, and shipping piers all over the U.S. Since 1918, over 100,000,000 sq. ft. of floor has been resurfaced with Permaflex. Permaflex is the original mastic . . . the only mastic capable of heavy duty! It bonds perfectly . . . never comes loose! Practically maintenance free! Permaflex is installed over old or new concrete, wood, brick or stone floors, walks or drives. Interior or exterior. A demonstration will convince you not to accept any substitute mastic (see test offer below). For if it isn't Permaflex . . . it isn't permanent!

NO DOWNTIME!

No need to move machines and stop production when you resurface with Permaflex. Floors are finished to a feather edge right up to equipment. Eliminates chipping problem! Smooth Permaflex floors are ready for foot traffic in 6 to 8 hours, heavy trucking in 24 hours, depending on drying conditions. Cost is amazingly low.

FREE LITERATURE FREE TEST OFFER

Write for 100 sq. ft. trial offer. Also free literature.

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1846 NORTH FRONT STREET, PHILA. 22, PA.
Specialists in industry flooring for over 35 years

Circle 669 on postcard, page 33

DATA FILE

(Begins on page 242)

ti-friction bearings, describing each product. SKF Industries, Inc.

For a copy, circle 415 on Post Card

Takeups in Seven Frame Styles

Sixteen-pp Book 2741 describes takeups with sleeve, ball or roller bearings, listing more than 320 different units for adjusting head or foot shafts on conveyors or elevators. Includes data on new multi-bearing frames. Link-Belt Co.

For a copy, circle 416 on Post Card

Shaft, Flange Mounted Drives

Design and construction advantages of shaft and flange mounted drive are detailed in 36-pp Bulletin 7100. Operation and election information is included with dimensional data. The Falk Corp.

For a copy, circle 417 on Post Card

INSULATION

Fiber Glass Pipe Insulation

Properties and advantages of fiber glass pipe insulation are detailed in Bulletin F-110. Tables list dimensions. Pittsburgh Plate Glass Co.

For a copy, circle 419 on Post Card

Flexible Foamed Plastic Insulation

Ultra*Foam pipe and sheet insulation for plumbing, heating, air conditioning, and processing is described in this product bulletin, along with data on temperature limitations and efficiencies. Gustin-Bacon Mfg. Co.

For a copy, circle 420 on Post Card

PUMPS, COMPRESSORS

Pump Selection Catalog

Included in 12-pp, easy-to-use Circular 184 are charts showing temperature ranges from —350 to +1000 F, and pressures to 1000 psig for 10 classifications of pumps. Dean Brothers Pumps, Inc.

For a copy, circle 421 on Post Card

For Free-Flowing to Solid Operation

Bulletin 30-C, 8-pp, outlines advantages of pumps which handle free-flowing liquids to nonpourable pastes and abrasive solids. Describes operation. Robbins & Myers, Inc.

For a copy, circle 422 on Post Card

Close-Coupled Single Suction Pumps

Mechanical, hydraulic and application data is featured in Bulletin 975-G, 24 pp, on close-coupled single suction pumps—special small, small, medium, large and oversize. Buffalo Pumps Div., Buffalo Forge Co.

For a copy, circle 423 on Post Card

Technical Data on Rotary Pumps

This selection manual on rotary pumps groups liquids according to viscosity. The Deming Co.

For a copy, circle 424 on Post Card

Rotary Gear Pumps

Features and advantages of the Gearex pump, which employs the basic rotary gear principle to move liquid, are detailed in 6-pp Bulletin G-3. Cutaway view illustrates construction. Sier-Bath Gear and Pump Co., Inc.

For a copy, circle 425 on Post Card

End Suction Pumps

Described in Bulletin 158 are horizontal shaft, single stage and suction pumps for handling abrasive mixtures, slurries, corrosive and hot liquids. Nagle Pumps, Inc.

For a copy, circle 426 on Post Card

Heavy-Duty Liquid Pumps

Described in Data Sheet SP-507 are pumps for paints, inks and abrasive liquids. Features are illustrated and dimensional data included. Viking Pump Co.

For a copy, circle 427 on Post Card

Packaged Compressor Stations

Operational and design features of packaged compressor stations for gas lift, repressuring, recycling, plant feeders, refining, gas transmission, multi-service, etc. covered in Bulletin 191, 6-pp. Clark Bros. Co.

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Water-Cooled Compressors

Described in Bulletin LA-1 are the LA and LB water-cooled compressors, the LA for operation at normal plant pressures and the LB for high pressure use. Gardner-Denver Co.

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Heavy Duty Air Compressors

Performance details and basic construction features of heavy duty air compressors for continuous operation are detailed in 36-pp Bulletin A-43. Data tables included. Joy Mfg. Co.

For a copy, circle 430 on Post Card

Angle Air Compressors

Bulletin 625, 8 pp, contains information on features and operation of angle air compressors designed to provide efficient air service in small space. Cutaway views show component features. Pennsylvania Pump & Compressor Co.

For a copy, circle 431 on Post Card

The Compressor Valve Story

Operation and importance of valves in modern reciprocating compressors are described in 44-pp Form 3222. Question-and-answer format details demands made on valves and their function in a compressor. Booklet traces evolution of valving from 18th century. Ingersoll-Rand Co.

For a copy, circle 433 on Post Card

PACKINGS, GASKETS, SEALS

Spiral-Wound Gaskets

Revised 20-pp Folder AD-176 gives information on Guardian paper thin gaskets and high temperature gaskets made with ceramic filler material. Covers construction, specifications, styles. Garlock, Inc.

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flexible gear coupling you can buy!

Now you can transmit power in a wide range of speeds and capacities with the *14 ounce* Nyflex® "Mite" nylon sleeve coupling. Use it in both the vertical and standard positions at speeds to 5000 rpm without lubrication. The "Mite" absorbs up to ±3° misalignment at these speeds yet the whole coupling is less than 3" in diameter.

The "Mite" is available *now* in ⅜" rough bore and 8 finish bore sizes from .500" to 1.125" through over 150 industrial distributors. Use the inquiry card or write direct to Sier-Bath for the name of your nearest distributor and complete performance and specification information on the "Mite".

SEND FOR YOUR DESIGN CATALOG TODAY!

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Founded 1905

Circle 670 on postcard, page 33

FREE BOOKLET TELLS WHY TRANSITE® PIPE DELIVERS INDUSTRIAL WATER AT LOW COST

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Please send me, without obligation, your new booklet on Transite Industrial Water Pipe.

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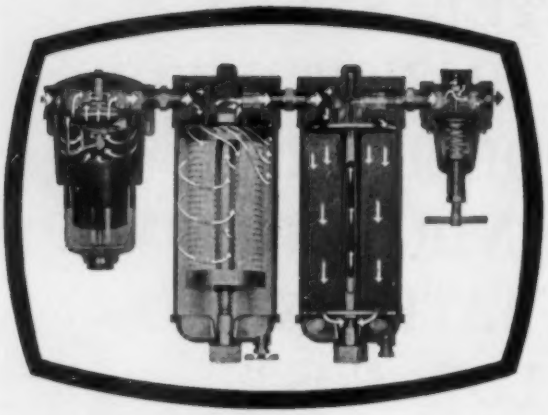
Circle 671 on postcard, page 33

NEW DEHYDRATOR



package provides "instrument pure" compressed air only where needed

The WILKERSON "Chem-Guard" is available singly or in a package as illustrated.

EXCLUSIVE FEATURES

- Lowest price
- Dependability assured
- Simplified, economical servicing
- Built-in visible indication of affluent air relative humidity

WRITE TODAY

for complete information on the NEW "Chem-Guard", Circular #1043.

WILKERSON CORPORATION

Dedicated to keeping the NEW in pNEUmatics

1638 W. Mansfield, Englewood, Colo.

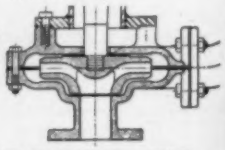
Circle 672 on postcard, page 33

NO "BUGS" IN THESE NAGLE PUMPS

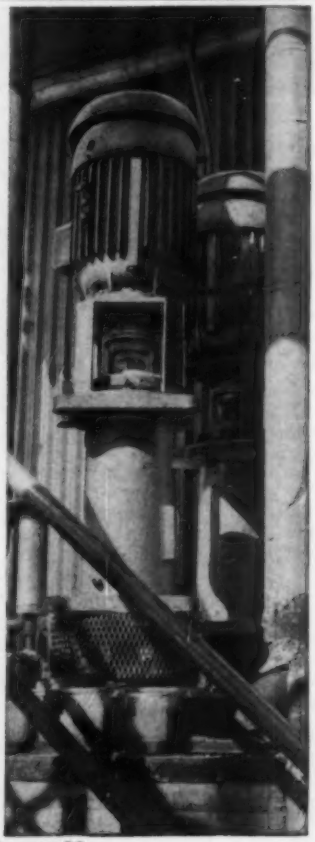
California Chemical Co. Pumps Molten Ammonium Nitrate for Use in Their Ortho Fertilizers These two 1" Nagle type "CWO-CS" vertical shaft pumps are ably handling 99.8% ammonium nitrate at 330°F., destined for use in well-known Ortho brand fertilizers. Pumps shown are at the Kennewick, Wash., plant of California Chemical Co.

The Nagle "CWO-CS" is "tailor made" for this application, because there are no bearings below the floor plate or near the pumped solution, and there is no rubbing contact between revolving and stationary parts below the radial bearing. All bearings sealed against contaminants. Seal problems entirely avoided. Send for Nagle Pump Selector—describes the complete line of Nagle Pumps.

(ORTHO® T.M OF CALIFORNIA CHEMICAL CO.)



Center split casing—two halves bolt together. Bottom entrance arrangement eliminates trouble from solids settling and clogging. Truly a pump for tough pumping jobs.



Tough jobs call for

Nagle PUMPS FOR ABUSIVE APPLICATIONS EXCLUSIVELY

NAGLE PUMPS, INC.

1267 Center Ave., Chicago Heights, Ill.

Representatives in Principal Cities

Circle 673 on postcard, page 33

DATA FILE

(Begins on page 242)

Compression Packings

Featured in this 22-pp catalog are compression packings, including sheet and rod seal types, packing materials, and list of packings for various services. E. F. Houghton & Co.

For a copy, circle 435 on Post Card

Impregnated Felt Gasketing

Featured in product bulletin is TFE-fluorocarbon impregnated felt for gasketing under extreme conditions. Properties and uses are detailed. E. I. du Pont de Nemours & Co., Inc.

For a copy, circle 436 on Post Card

Teflon Packing Products

Bulletin CP-552 describes Teflon ring packings, Teflon impregnated asbestos packing, V-type packing and seal cage—for acids and strong chemicals. Bulletin CP-553 covers jacket gaskets, solid ring gaskets, expansion joints and special gaskets. Bulletin CP-554 illustrates special parts. Chemical & Power Products, Inc.

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HEATING, VENTILATING—

Industrial Unit Heaters

Direct-fired, vertical delivery unit heaters, designed to solve heating problems in commercial and industrial buildings, are covered in 6-pp Bulletin IGV-660. Modine Mfg. Co.

For a copy, circle 439 on Post Card

Heaters For Industrial Applications

Detailed information on electric heaters is given in 20-pp Bulletin EC-261-R. Illustrates suspension or portable and duct heaters, natural and radiant convection heaters, infra-red heaters. Commercial Control Corp.

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Electric Comfort Heating

Application information on electric comfort heating equipment is presented in 16-pp Catalog 975-D. Includes dimensions and engineering data on baseboard heaters, forced air wall insert heaters, radiant heaters, floor drop-in types, cabinet convectors, snow melting mats, unit ventilators, unit heaters, blower units. Edwin L. Wiegand Co.

For a copy, circle 441 on Post Card

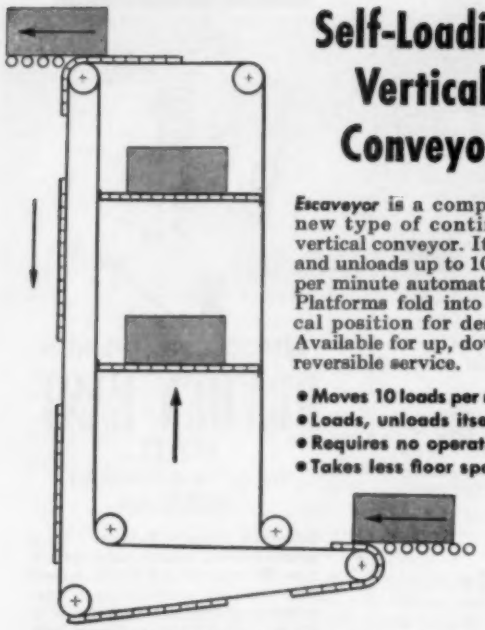
Heating, Air Conditioning Equipment

Air conditioning and heating equipment is featured in 20-pp Bulletin B-151A. Convector radiators, perimeter heating, hot water heating equipment, heating system controls, unit heaters and air conditioning units are described. Warren Webster & Co.

For a copy, circle 442 on Post Card

Efficient Roof Ventilators

Engineering data on roof ventilators, fans and blowers—including the Vertiget, automatic Airjet, reversible, mushroom head and stack cap types



Self-Loading Vertical Conveyor

Escaveyor is a completely new type of continuous vertical conveyor. It loads and unloads up to 10 units per minute automatically. Platforms fold into vertical position for descent. Available for up, down, or reversible service.

- Moves 10 loads per minute
- Loads, unloads itself
- Requires no operator
- Takes less floor space

WRITE TODAY *for descriptive brochure with performance data, drawings, photos of actual installations. Standard Conveyor Co., 305-J Second St., N. St. Paul, Minn.*

Standard Conveyor Sales and Service in more than 40 Principal Cities

Circle 674 on postcard, page 33

NOW..YOU CAN SHINGLE A FACTORY ROOF

WITH CLASS "A" FIRE SAFETY-RATED PHILIP Carey FIRE-CHEX SHINGLES

For roofs down to 2" slope . . . exclusive 25 year guaranty bond . . . available through your roofing contractor or your building supply dealer. Mail coupon for important fact folder.

The Philip Carey Mfg. Co. Dept. PE-961 Cincinnati 15, Ohio

Send me your fact folder, "Now You Can Shingle a Factory Roof."

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Circle 675 on postcard, page 33

ON THE BUS THAT GOES HERE

YOU COULD SAVE $3000

BY SPECIFYING ALCOA ALUMINUM

If you had been present when this plant* in Wickcliffe, Ohio, was being built, you might have been confronted with the problem of installing bus to carry the 12,000-amp load from four rectifiers to the six plating lines.

The alternatives were either copper or aluminum. The choice was obvious: *aluminum*. Because aluminum bus to do the equivalent job cost $3,000 less than copper.

This saving in direct material costs is just the beginning when you specify Alcoa® aluminum bus conductor.

You'll also find that aluminum is easy to handle, since it weighs only one-half as much as copper. You can cut it, drill it, bend it—with ease and complete satisfaction.

With Alcoa bus, you have a wide choice, too. Select from flat, round, tubular, channel, integral web and sector shapes.

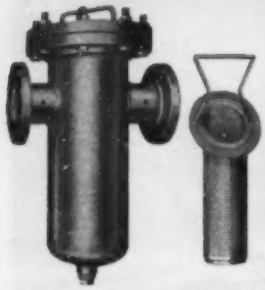
If you'd like more details about getting the job done and saving money with Alcoa aluminum bus, contact your Rome Cable Division representative. Or refer to our definitive 270-page volume, entitled "Alcoa Aluminum Bus Conductor Handbook." Address your inquiries to Rome Cable Division of Alcoa, Dept. 5-91, Rome, N. Y.

*Name furnished on request

ALCOA
ROME CABLE
DIVISION

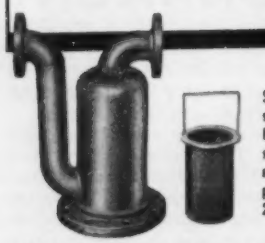
Circle 676 on postcard, page 33

individualized
TO YOUR NEEDS
MULTI-METAL
TRAP STRAINERS



Stainless steel resin trap strainer for demineralized water at 180 psi in nuclear power station.

Basket-within-basket strainer, with quick opening cover for water-soluble adhesives.



Strainer with special shell for PVC resin in solvent, for max. operating pressure of 250 psi.

These and many other strainers and filter-strainer units are the result of Multi-Metal's ability to test, design, engineer and produce practical units that solve particular problems of strainer installation, operation, cleaning and maintenance. Bulletin 601 tells how. Get a copy.

MM MULTI-METAL
WIRE CLOTH CO., INC.
1363 Garrison Ave., New York 59, N. Y.

Circle 677 on postcard, page 33

DATA FILE

(Begins on page 242)

—is presented in 16-pp Bulletin A-112E. Hartzell Propeller Fan Co.

For a copy, circle 443 on Post Card

Air Engineering Data File

Bulletin E-57. 24 pp, covers engineering and test facilities for propeller fans, specifications, construction, maintenance and installation with tables for estimating air-handling. Aerovent Fan Co., Inc.

For a copy, circle 445 on Post Card

Make-Up Air Solutions

Bulletin EN-5911 explains how air properly introduced eliminates problems arising when fans draw fumes, smoke or odors. Reznor Mfg. Co.

For a copy, circle 446 on Post Card

Air Handling Equipment

Product Bulletin B-5216 describing air handling, air cleaning, air conditioning and mechanical draft equipment, including heating and ventilating equipment, industrial process and mechanical draft apparatus, others. Westinghouse Electric Corp.

For a copy, circle 447 on Post Card

Industrial Fan Selector

Comprehensive selection tables for Type BL fans with rotor and inlet bell designed for high static efficiencies and minimum noise levels are presented in 76-pp Bulletin F-104-A. Covers rotors, single and double inlet fans, belt and direct drive fans, dampers, high temperature fans, special fans. Buffalo Forge Co.

For a copy, circle 448 on Post Card

Rotary Positive Blowers

How a lobe-type, rotary positive displacement blower delivers a metered amount of air against varying pressures with a minimum amount of friction is explained in 12-pp Bulletin S-32-A. Diagrams and charts illustrate design, dimension and performance data for vertical and horizontal models. Sutorbilt Corp.

For a copy, circle 449 on Post Card

BOILERS, BURNERS

Self-Contained Steam Generators

Descriptive details and table of steam generator specifications for oil-fired, gasoline engine drive units included in this data sheet. Clayton Mfg. Co.

For a copy, circle 450 on Post Card

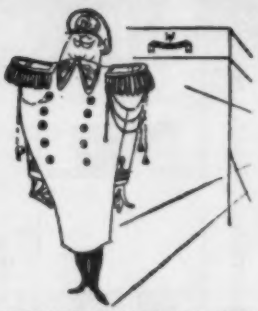
Heavy Oil Burners

Illustrated and described in 8-pp Bulletin 1 is an oil burner engineered to make use of low-cost, high-heat content heavy fuel oils. Industrial Combustion Inc.

For a copy, circle 451 on Post Card

Packaged Steam Generators

Bulletin AA2760, 18 pp, features automatic packaged steam generators. Analysis of boiler design fac-



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Salon-size rooms • Terraces • New appointments, newly decorated • New 21" color TV • FM radio • New controlled air conditioning • New extension phones in bathroom • New private cocktail bar • Choice East Side, midtown area • A new concept of service. Prompt, pleasant, unobtrusive.

Single $15 to $22 Suites to $60
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MANUAL on INSULATION TESTING
of Cables, Wiring, Motors, Transformers, Capacitors, Appliances

For better maintenance and production testing . . request Manual D-62.

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Direct reading megohms, ohms and voltage scales. Self-powered, accurate, no leveling or cranking. Write for your copy of this practical manual.

Model 201 . . . Measures to 200 megohms at 500V-DC test potential, also 2000 ohm scale. AC and DC volts ranges 0-150/300/600. Only $136.50. Send for bulletin listing all VIBROTEST models.
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Circle 679 on postcard, page 33

If **cyclonic collection** will clear your dust problem—a **Multiclone** by Western Precipitation will do it best.

HIGH EFFICIENCY. Multiple **small**-diameter collectors—a WP-pioneered feature—generate greater centrifugal forces for higher separating efficiency.

MORE ECONOMY—all along the line. Basic cost, installation, housing, maintenance all are less. No costly, complicated ducting. Highly adaptable units can often be fitted into existing structures. No moving parts—and cast iron tubes and vanes **last.**

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Dust and fume control since 1907

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The Superior System of Galvanized Channel Framing completely illustrated, showing easy installation methods to answer all electrical, mechanical and industrial problems. The Globe system of metal framing permits *fast* assembly, disassembly and reassembly, with the strength of welded material, but without the necessity to cut and throw away the framework when changes are necessary. Can be set up with a hacksaw and a wrench. Ideal for any framing or suspension use: fluorescent light fixtures, acoustical ceilings, cable trays, shelving, storage racks—with complete accessories for pipe and conduit suspension, concrete inserts, maple clamps, pipe rollers and clamps and porcelain cable clamps.

Write for your FREE Copy Today 121

PRODUCTS DIVISION THE GLOBE COMPANY

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two of a kind...

for all in-plant requirements

direct-connected

Gas-fired

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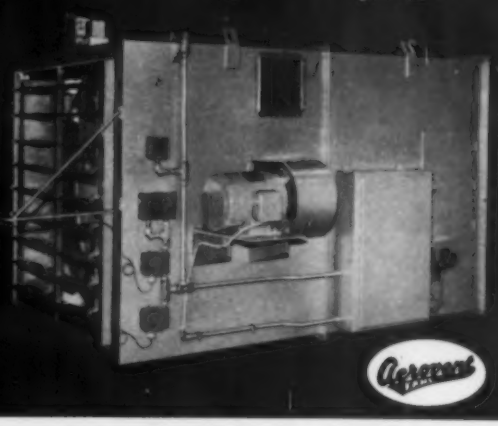
air make-up units



Let the breezes blow! You can maintain uniform temperatures and derive maximum efficiency from heating and ventilating systems *this* winter with Aerovent Gas-Fired Air Make-Up Units. And, you will be ready for next summer's heat, too, since each unit also serves as a filtered air supply unit. Why not investigate, today?

Standard models for all structures and all requirements in sizes 27" through 60" for capacities to 50,000 CFM and BTU/hr ratings to 4,875,000. Other units to specifications for capacities to 100,000 CFM and heat releases to 10,000,000 BTU/hr. Write for details and application data included with new Bulletin 860.

Air deliveries of all Aerovent equipment are tested and rated in accordance with established and accepted codes and each unit is guaranteed by the manufacturer to deliver its rated performance. CERTIFIED PERFORMANCE

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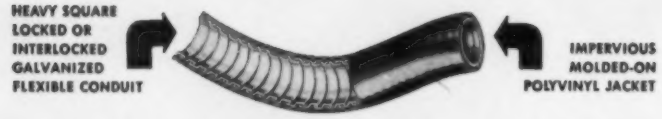
Circle 682 on postcard, page 33

VULNERABLE CIRCUITS NEED

LIQUATITE®

FLEXIBLE CONDUIT PROTECTION



Liquatite insures against costly down time due to wiring failure. It protects against contamination, vibration, motion and shock; proves ideal for "wet locations," around corrosives or where severe punishment may cause shorts or burn-outs.

Added to this, Liquatite installs as easily as any Flexible Conduit —follows contours, takes small radius bends necessary for hard-to-get-at locations.

Write today for free sample, costs and name of Distributor nearest you.

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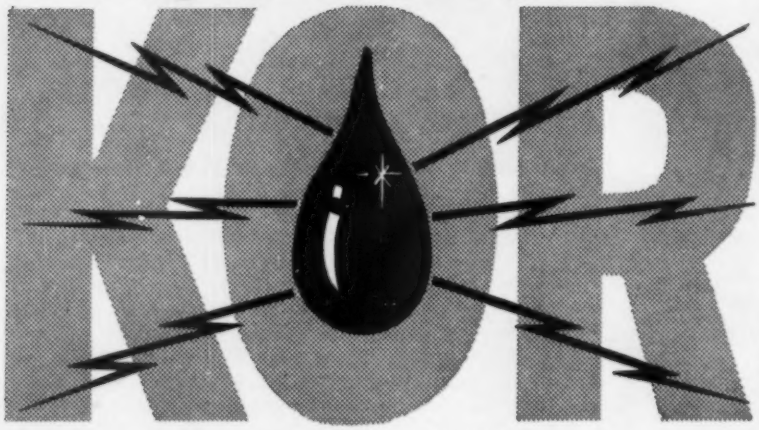
TYPE LA UNDERWRITERS' APPROVED

ELECTRI-FLEX COMPANY

P. O. Box 128-I • Roselle, Ill.

Circle 683 on postcard, page 33

Put more POWER in your fuel oil with



World's most powerful fuel oil additive!

- **KOR gets more power** from any kind of fuel oil: petroleum pitch, other residual oils, coal tar, diesel oil.
- **KOR dissolves sludge,** prevents it from forming, suspends it in solution for fast combustion!
- **KOR keeps systems clean** from tank to stack, eliminates soot and carbon scale, cuts cleaning costs. It's alkaline, non-corrosive!
- **KOR cuts fuel costs,** activates all the BTU's in both oil and sludge. Safe and easy to use. Write for literature today!

KOR CORPORATION 711 Box 485, Gary, Indiana

Circle 684 on postcard, page 33

DATA FILE

(Begins on page 242)

tors is included with performance data. Ames Iron Works, Inc.

For a copy, circle 452 on Post Card

For Economical Operation

Automatic boilers (with the two-pass design) are discussed in Form BE-400. Boilers covered include 20 to 600 hp steam, hot water and HWT boilers. Continental Boiler Div., Boiler Engineering & Supply Co., Inc.

For a copy, circle 453 on Post Card

HOSE

Hose - Large and Long

Details on large diameter hose available in long lengths without coupling are presented in Bulletin 862-947-66. Typical applications illustrated. The Goodyear Tire & Rubber Co.

For a copy, circle 454 on Post Card

Industrial Hose, Expansion Joints

Selection data and specifications on corrugated industrial hose made of pressure tubing are presented in 12-pp Catalog 233. Includes section on low and high-pressure expansion joints. Flexonics Div., Calumet & Hecla, Inc.

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SAFETY

Fire-Resistant Fluids

This series of specification sheets on fire-resistant fluids covers synthetics, oil-in-water and water-in-oil emulsions, glycols. Mobil Oil Co., Inc.

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Signs for Industrial Safety

Catalog 11, 66-pp, illustrates signs for industrial accident prevention—danger, caution, directional, information and safety instruction signs. Prices given. Stonehouse Signs Inc.

For a copy, circle 457 on Post Card

CORROSION CONTROL

Cathodic Protection for Tanks

Protection of submerged areas of steel structures against corrosion is discussed in Bulletin TP-112-E. Information on why tanks corrode, how company's system prevents corrosion given. Electro Rust-Proofing Corp.

For a copy, circle 458 on Post Card

Why Cathodic Protection

Protection against corrosion for pipelines, tank storage terminals, oil and gas well casings and other applications are detailed in Bulletin. RCR-IIII. Rome Cable Div., Aluminum Co. of America.

For a copy, circle 459 on Post Card

Corrosion Control

Process Bulletin B6 discusses causes and control methods of condensate

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they can also save lives and property**

VIBRATONES are the 1961 version of the well-known vibratory industrial horn—
they call people—signify start and dismissal—
or can be used as quick, simple warnings.
Simple accessories provide for interior or exterior use;
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The flexibility and adaptability of the FEDERAL VIBRATONE
is unmatched in the industrial signalling field!

FEDERAL Bulletin #105 describes the VIBRATONES
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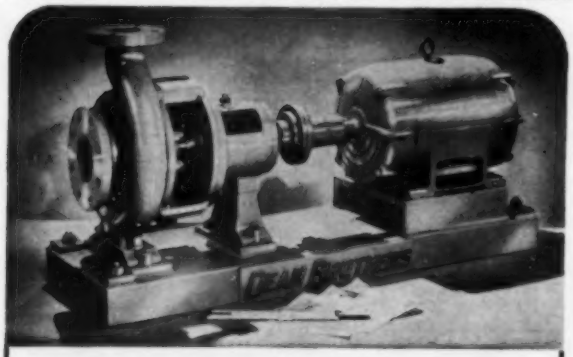

FOR EASE IN SOLVING CORROSION PROBLEMS CHECK THE 4 E's OF DEAN BROTHERS TYPE pH PUMPS

- ✓ **Easy to Select**—28 sizes (14 horizontal, 14 vertical) available in 14 corrosion-resistant alloys, to fit your special pumping problem.
- ✓ **Economical to Buy**—Low first cost combined with easy servicing and maximum interchangeability of parts make pH pumps lowest cost in the long run.
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- ✓ **Economical to Operate**—Fully open impellers for slurries and clear liquids contribute to long, trouble-free service life with minimum down-time.

For Complete Information Write for Circular 217

DEAN BROTHERS PUMPS INC.
INDIANAPOLIS 7, INDIANA
The Best Is Our Standard

Circle 686 on postcard, page 33

Shave heavy window replacement costs . . . use BARRETT plastic panels!

Fiberglass panels used for skylighting, side-lighting, or glazing give you a saving because they're shatterproof, resist chemicals, cut lighting bills, can be installed easily and maintained economically.

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BARRETT DIVISION
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Allied Chemical

Circle 687 on postcard, page 33

How much will a 50% cut in bulk handling costs add to your profits ?

Probably a lot, if your plant is at all like the thousands now using Roura Hoppers. With a Roura self-dumping hopper on your lift truck one man can do the work of two . . . and use less time doing it.

Roura Hoppers attach in seconds to any lift truck (fork or platform). They can't slip off. Operator picks up loaded hopper, transports it, releases the latch—and the hopper *automatically* dumps itself, rights itself, locks itself. The *Roura Way* adds to your profits because it's the fastest, lowest cost method of handling bulk materials and small parts —hot or cold, wet or dry.

SPECIFICATIONS: Eight sizes, 1/3 to 4-yard capacities. Construction: 3/16" steel plate with continuous arc-welded seams. Heavier plate, stainless, aluminum, galvanized available. Mounted on live skids or choice of wheels. Standard models shipped from stock.

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ROURA
Self-Dumping
HOPPER

WANT MORE DETAILS? Just clip this coupon to your letterhead and mail to
ROURA IRON WORKS, INC.
1413 Woodland Ave., Detroit 11, Michigan

Circle 688 on postcard, page 33

DATA FILE

(Begins on page 242)

system corrosion. Condensate corrosion inhibitors described. Nalco Chemical Co.

For a copy, circle 460 on Post Card

FILTERING

Filters for Industry
Illustrated and described in this product bulletin are filters for many applications, including liquid filters, intake filters, pipe line filters, others. The Dollinger Corp.

For a copy, circle 461 on Post Card

Improved Filters
Bulletin GEO-507 describes Fulflo filters for compressed air and other gases, covering single tube models for operating pressures from below 125 psi to 4000 psi, and flow rates to 800 scfm; also multi-tube models. Commercial Filters Corp.

For a copy, circle 462 on Post Card

Replaceable Air Filters
Characteristics and applications of Micromat filter media for use in air conditioning, heating and ventilating are detailed in this product bulletin. Microtron Corp.

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OTHER EQUIPMENT

For Air Conditioning, Processing
Twenty-pp Catalog DS-435 features a hermetic, packaged absorption refrigeration machine which uses low pressure steam to produce chilled water for air conditioning and process applications. The Trane Co.

For a copy, circle 464 on Post Card

Blast Cleaning Methods, Equipment
Blast cleaning and finishing methods and equipment are provided in Bulletin 1230, 24-pp. Features blast cleaning barrels, tables, descaling machines, dust control equipment and abrasives. Pangborn Corp.

For a copy, circle 465 on Post Card

Flame-Resistant Products
Structural panels, skylight louvers, chemical duct-work and other products of Hetron, a flame-resistant polyester resin, are covered in Bulletin D-6. Hooker Chemical Corp.

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Blowers for Agitation Applications
Bulletin 142C describes turbine type blowers for sewage treatment and other agitation applications in chemical, food processing and other fields. The Spencer Turbine Co.

For a copy, circle 467 on Post Card

Compressed Air Products Guide
Color-coded for product identification, Catalog 158, 24-pp, contains information on filters, regulators, lubricators, drains and accessories. Wilkerson Corp.

For a copy, circle 468 on Post Card

Any of these bulletins, catalogs and technical booklets can be yours without cost or obligation. Use the Reader Service Cards on page 34.

Tinting for Sun Protection
Advantages of a glass tinting process that is applied to existing windows and glass areas are detailed in Pamphlet Form F-347-1. American Glass Tinting Corp.

For a copy, circle 469 on Post Card

Air Engineering Equipment
Among equipment described in Bulletin 106 are air conditioners for heat and moisture control, heating apparatus, refrigeration equipment, liquid coolers, evaporative coolers for liquids and gases, vapor and gas condensers, compressed air aftercoolers, fans and blowers. Niagara Blower Co.

For a copy, circle 470 on Post Card

Technical Training Facilities
Technical training programs available to industry are described in this

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FOR MEASURING TANK CONTENTS
ANY DISTANCE AWAY

TANK MAY BE BURIED, ELEVATED, OPEN, CLOSED, VENTED OR UNDER PRESSURE OR VACUUM

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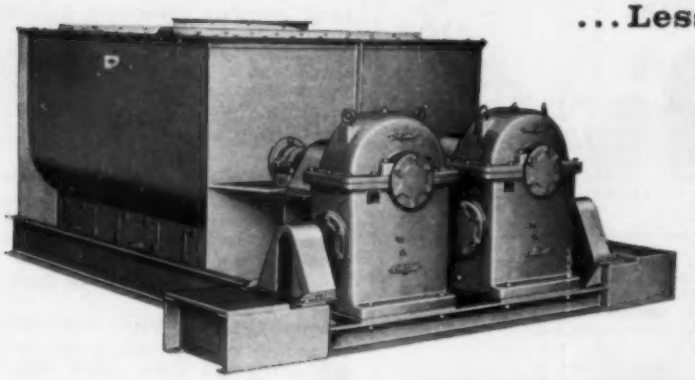
Circle 689 on postcard, page 33

EHRSAM DOUBLE-BARREL MIXER

Increases Productivity ...Lessens Costly Downtime



The Ehrsam double-barrel paddle mixer writes its own ticket for economy and increased productivity as a fast, heavy-duty machine for the intensive blending of dry, powdered or granular materials.

Precision engineering and construction cut costly, annoying downtime. Steel plate mixing barrels, adjustable stuffing box seals, heavy-duty roller bearing pillow blocks are only a few of the stress points designed to withstand abusive, day-after-day operation.

Combined with a surge hopper, charging hopper with scales, Ehrsam will program an automatic charging, mixing, and discharge operation to your specifications.

20 TO 120 CUBIC-FOOT MODELS AVAILABLE

The J. B. EHRSAM & SONS MFG. COMPANY

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EHRSAM Enterprise, Kansas

Please send new Ehrsam Mixer Catalog 8A. I am also interested in surge hoppers____; screw conveyors____; Dracon____; belt conveyors____; and bucket elevators____.

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TOWN_____ STATE_____

E-M/2-661

Circle 690 on postcard, page 33

NEW PLASTIC PATCH REPAIRS INDUSTRIAL FLOORS IN MINUTES

SO EASY TO USE—Even Your Secretary Could Apply It!

Why halt traffic for floor repairs in your busy plant? **Ranco MAGIC FLOOR** is ready-to-use, and needs no drying time. Just compress with ordinary lift truck—no laborious tamping or troweling. Traffic can roll **immediately** over the fresh floor patch.

MAGIC FLOOR is now available in a highly versatile, fine grading which can be applied thick or thin to excellent feather edges. Ideal for EXPANSION JOINTS broken to a V-shape. No skilled labor needed.

FREE SAMPLE: Send for a 2-gallon of MAGIC FLOOR, freight prepaid, no charge or obligation. Simply request on your company letterhead.

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Write M 8899 on the Inquiry Card

Circle 691 on postcard, page 33

Safe... Electric Heating for Hazardous Locations

- **Underwriters' Laboratory approved for:**
  1. Outputs of 3,413 to 20,490 BTU where atmospheres contain gasoline, naphtha, benzol, alcohol, natural gas, acetone, lacquer.
  2. Output of 1,706 BTU (panel heater) where ethyl ether vapors are present.
- **Comfortable, even-flowing heat.**
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- **Available in 120, 208, 240 or 480 volts.**

For more information, write:

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NOW 15 to 450 GPM!

VIKING'S ENLARGED LINE OF HEAVY DUTY HELICAL GEAR DRIVEN PUMPS

Figs. 288 and 388 units with size "C" reducers, capable of handling up to 25 H.P. at 350 pump R.P.M.; 40 H.P. at 520 pump R.P.M. 20 to 450 G.P.M. capacities. Five gear ratios available, using one gear case. Six pump sizes in this series.

You now have an even larger range of Viking's helical gear driven units to fit your pumping jobs. Speed and capacity now range from 15 to 450 G.P.M. They're ideal for handling both thin and thick liquids, ranging from gasoline to molasses. Pumps equipped with packing or mechanical seals. Gear reducers independently mounted. All components can be quickly changed. Step up your delivery with these quiet, positive discharge, self-priming pumps!

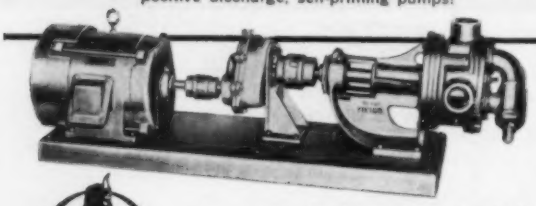

Fig. 288 units with size "B" reducers, capable of handling up to 10 H.P. at 1750 R.P.M. motor speed. 15 to 225 G.P.M. capacities. Six sets of gearing using one gear case. Six pump sizes in this series.

50 YEARS

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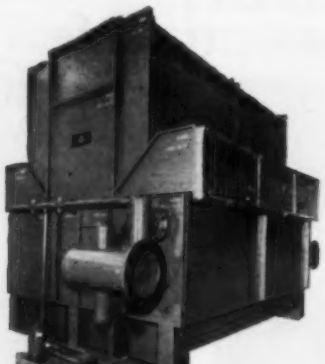
VIKING PUMP COMPANY

Cedar Falls, Iowa, U.S.A. In Canada, it's "Roto-King" Pumps

See Our Catalog in Sweet's Plant Engineers File

Circle 693 on postcard, page 33

You Get EXTRA SAVINGS From This Method of Compressed Air After Cooling



Cooling water savings and power savings quickly repay the cost of the Niagara Aero® (air-cooled) After Cooler for compressed air or compressed gases. In addition its long life and the labor-saving simplicity of its maintenance give you an extra profit in comparison with water-cooled surface contact methods.

With the Niagara After Cooler the heat of compression is removed and dispersed into the atmosphere by the evaporation of a very small amount of water. The compressed air temperature is always brought below that of the atmosphere surrounding your air lines, so that no further condensation can take place.

Large users of compressed air for plant services or processes choose Niagara Aero After Coolers for their dependable durability. They have been making good records of service for over 25 years.

Write for Bulletin 130.

NIAGARA BLOWER COMPANY

Dept. PE-9, 405 Lexington Ave., New York 17, N. Y.

Niagara District Engineers in Principal Cities of U. S. and Canada

Circle 694 on postcard, page 33

DATA FILE

(Begins on page 242)

16-pp brochure. Discusses training programs at company's own centers; training programs at industrial plants; and on- the-job training. Also discusses home study courses. Tech-Rep Div., Philco.

For a copy, circle 472 on Post Card

Vibration-Control Machine Mounts

Wedgmounts, Jacmounts and Air-Locs are described in Catalog 4011. Physical properties of mounting material. Clark-Cutler-McDermott Co.

For a copy, circle 473 on Post Card

Aluminized Steel Wire, Products

Described in 6-pp Folder DH-537B are steel core wires, steel strand guy wire, overhead ground wire, tie wire, messenger wire, telephone wire, chain link fabric and barbed wire. American Chain & Cable Co., Inc.

For a copy, circle 474 on Post Card

Equipment Upkeep

"The ABC's on Maintenance of Air and Hydraulic Equipment" is a 24-pp cartoon-type booklet presenting the "rights" and "wrongs" in setting up and servicing air and hydraulic equipment. Major reasons for unsatisfactory performances and steps to prevent them outlined. Logansport Machine Co., Inc.

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Brushing Tools For Industry

Described in illustrated, 16-pp bulletin are brushing tools engineered for industrial applications. Covers all types of brushes used in automatic deburring, manual deburring, off hand deburring, can cleaning and drying, fruit and vegetable cleaning, weld spatter removal, metal cleaning. Newark Brush Co.

For a copy, circle 476 on Post Card

Keys to Steel Satisfaction

Design, steel selection and heat treatment are described as the keys to optimum economy and material performance in this 77-pp Manual of information on increasing endurance limit of steels. Climax Molybdenum Co., Div., American Metal Climax, Inc.

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ASSISTANT PLANT ENGINEER

If you are a graduate electrical engineer, you may find this important position to be the step forward you have been looking for.

The expanding nature of our multi-plant operation necessitates the addition of a young, advancement minded engineer. This opening will primarily involve installation and maintenance of plant electrical equipment.

For further information concerning this professional opening, company growth, and employee benefits, send a confidential resume to

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Circle 695 on postcard, page 33

Markal

HEAT-PROOF COATINGS

Brush MARKAL Coating on piece of metal and apply direct flame of torch until metal is red hot. *Protective coating has not been impaired.*

MARKAL Coatings give you complete protection against steam, corrosion, scaling, oxidation at extreme heat—temperatures up to 2100°F.

Write for complete technical information and free sample . . . state work conditions.

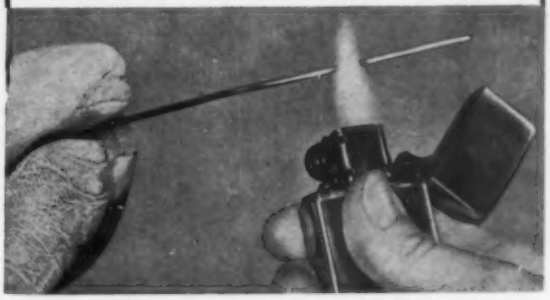
Markal COMPANY

3085 West Carroll Avenue • Chicago 12, Illinois

The Mark of Quality Protection—MARKAL!

Circle 696 on postcard, page 33

THE INSULATION FILM ON ACME ELECTRIC TRANSFORMER COILS WON'T BURN OFF!

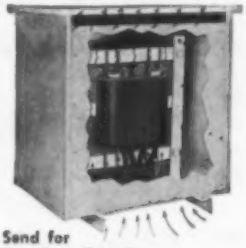


Here is amazing proof to demonstrate the heat resisting ability of the new insulation now used in the coils of Acme Electric dry type transformers. Illustration shows section of wire with new insulation film heated by direct flame to a temperature too hot to handle.

This picture shows carbon deposit from direct flame on heated wire.

This micro photo made after carbon deposit was wiped off shows exact area on wire where flame was applied. Completely free of carbonization or burning.

The new insulation film used on Acme Electric transformers will greatly surpass the 220°C. required for class H transformers. This great advancement in heat resistibility is but one of the many "no-extra cost features" of Acme Electric transformers.



QUIET performance — with sound levels far below acceptable standards; compact design; light weight, more KVA per pound, easy installation are other features that provide extra value.

Send for Dry Type Transformer folder AC-100.

SA63501/1088

ACME ELECTRIC CORPORATION

369 Water St. Cuba, N. Y.

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Acme ACME Electric
TRANSFORMERS

Circle 697 on postcard, page 33

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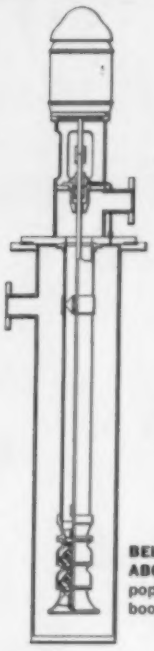

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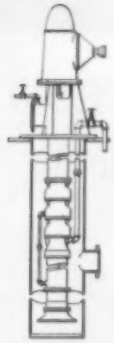

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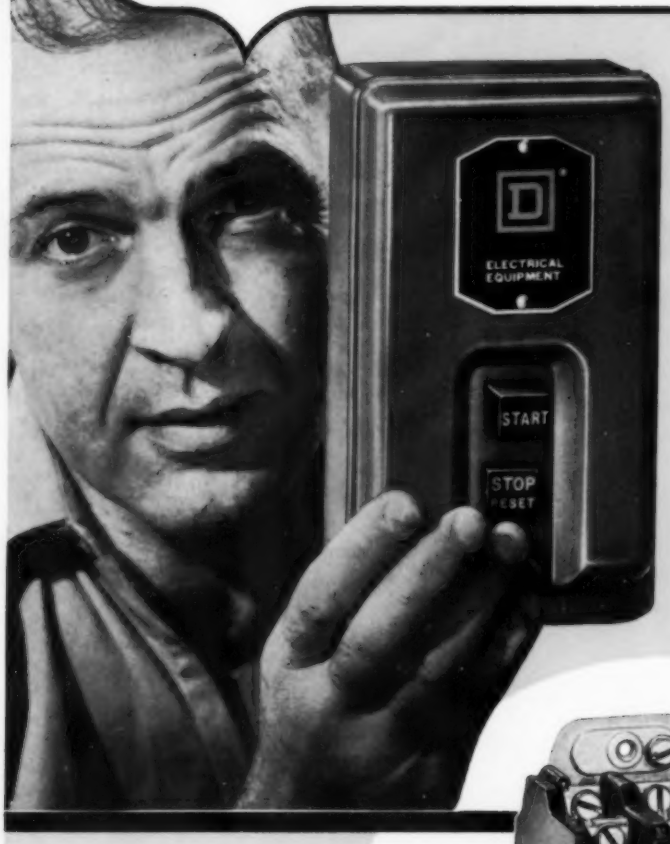
This NEW Manual Starter has EVERYTHING!



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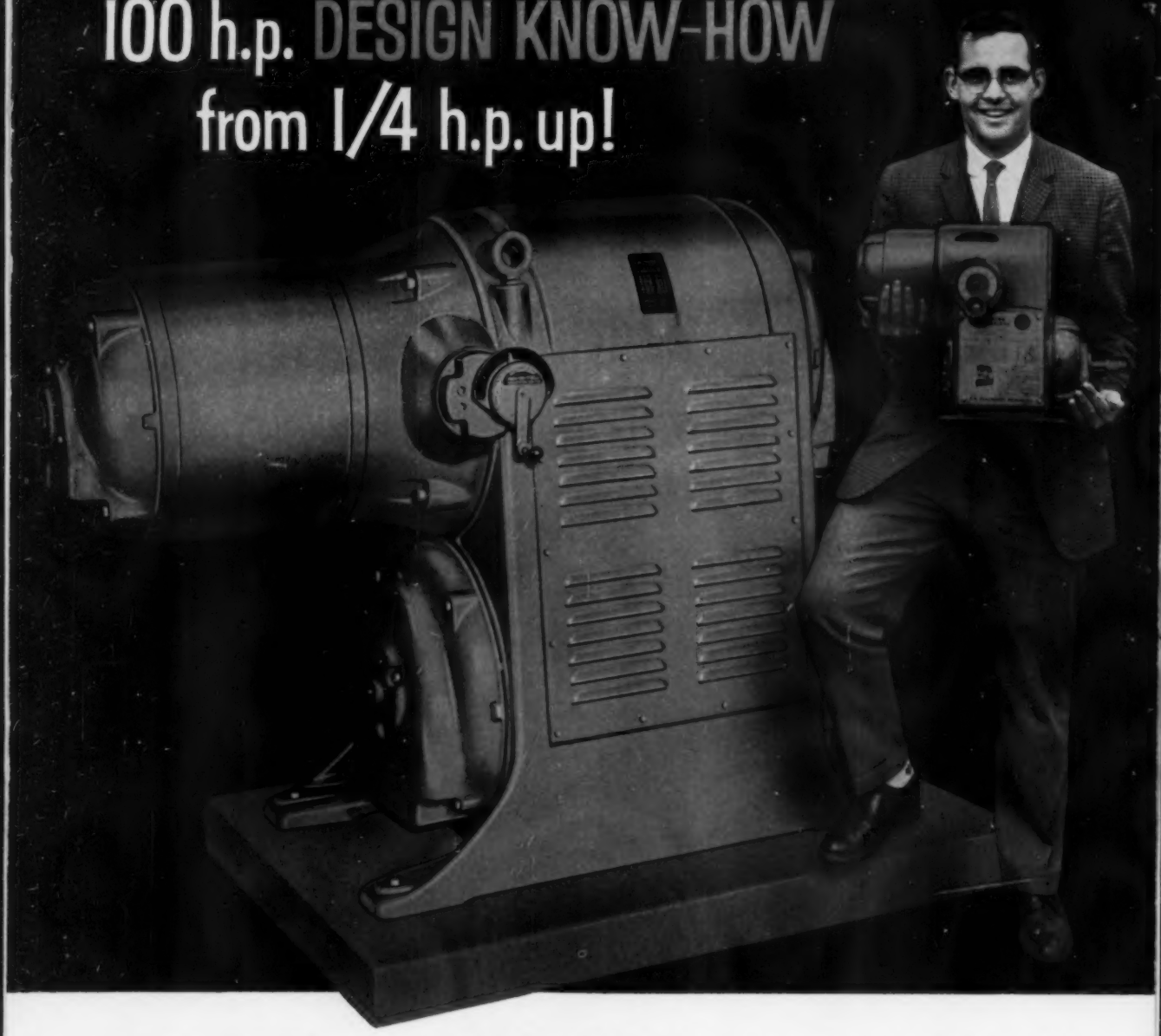

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